RENAL TUMORS

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Glenn(1980)

Benign Tumors
Renal capsule
Renal parenchyma
Vascular tumors
Cystic lesions, dysplasia, hydronephrosis
Heteroplastic, mesenchymal tumors
True oncocytoma

Tumors of Renal Pelvis
Benign papilloma
Transitional and squamous cell carcinomas, adenocarcinomas

Pararenal Tumors
Benign
Malignant

Glenn(1980)

Embryonic Tumors

Nephroblastoma (Wilms' tumor)

Embryonic, mesotheliomatous tumors

Sarcomas

Nephrocarcinoma

Renal cell carcinoma, adenocarcinoma, "hypernephroma"

Papillary cystadenocarcinoma

Other Malignancies

Primary: mesenchymal, hemangiopericytoma, myeloma

Secondary: metastatic lesions

Renal Cortical Adenoma

Small, evidently benign, solid renal **cortical lesions have been found at autopsy with an incidence 7-23%**

Renal Cortical Adenoma

- The majority of such lesions are solitary; 25% are multicentric
- Incidence increases with patient age
- more common in patients with von Hippel–Lindau disease (VHL) and acquired renal cystic disease associated with end-stage renal failure
- The male-to-female ratio is 3 to 1

Renal Cortical Adenoma

- The diagnosis of renal adenoma remains controversial, with many believing that all solid renal epithelial-derived masses are potentially malignant and should be treated as such.

- Renal exploration and wedge resection or other ablative therapies should be strongly considered, with appropriate consideration of patient age, comorbidities, and other relevant factors.

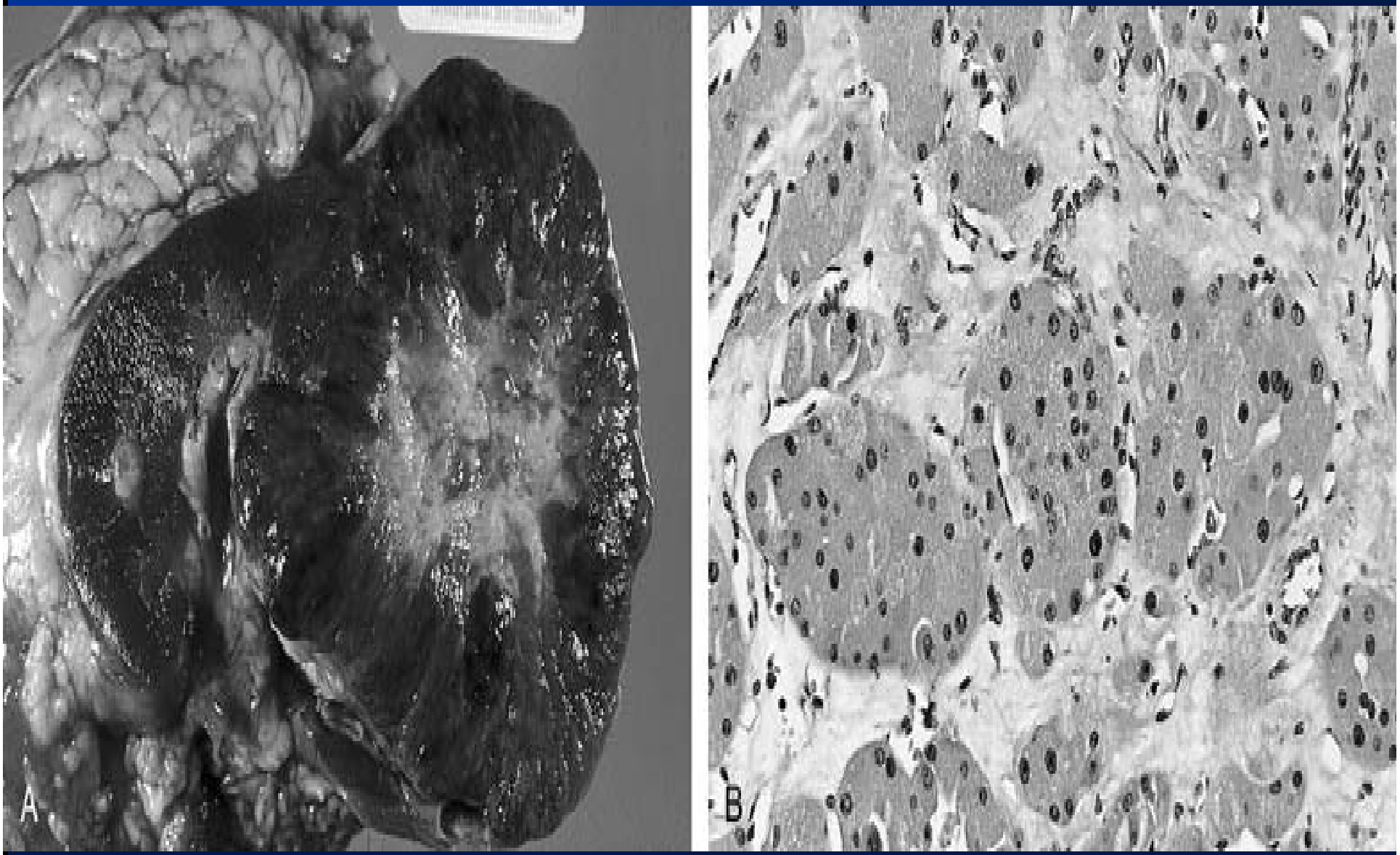
Oncocytoma

- 3% to 7% of all solid renal masses
- Grossly, these tumors are light brown or tan, homogeneous, and well circumscribed but, like most renal tumors, not truly encapsulated
- A central scar is commonly found, but prominent necrosis or hypervascularity is lacking.
- Site or origin is distal renal tubules

Oncocytoma

- Microscopically, uniform round or polygonal eosinophilic cells with granular cytoplasm, most commonly arranged in an organoid, tubulocystic, solid, or mixed growth pattern

- Ultrastructurally, oncocytomas are packed with numerous large mitochondria, which contributes to their distinctive staining characteristics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Oncocytoma

- Clinical picture
  - Usually discovered accidentally
  - Pain ,hematuria ,mass are found less frequently

- Investigation
  - CT, US and MR solid mass with central scar
  - Angiography typical spoke-wheal appearance

Oncocytoma

- Management

If pre operatively reliable diagnosis

NSS

If the diagnosis is not sure and the size beyond 5cm

Radical Nephrectomy

Angiomyolipoma

- Incidence
  - Isolated or as a part of syndrome associated with tuberous sclerosis
  - Tuberous sclerosis is familial syndrome characterized by mental retardation ,epilepsy and adenoma subaceum
  - In all patients hamartoma may be found in the brain ,eye, lung , heart and bone

Angiomyolipoma

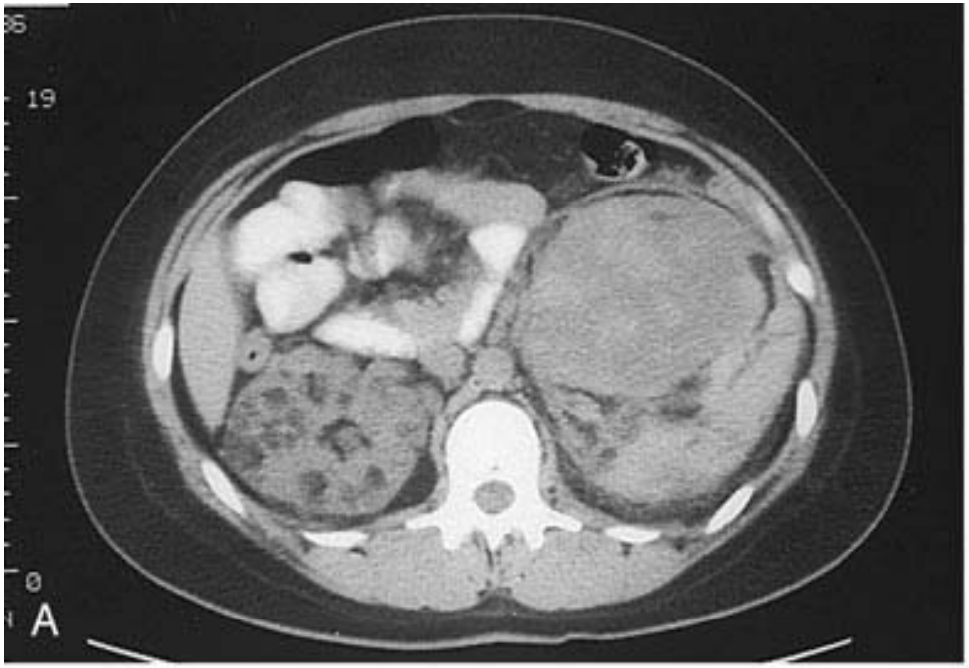
- Pathology
  - Macroscopic
    - Yellow and gray in color ,may attain a huge size and have propensity of profuse hemorrhage and multiplicity
  - Microscopic

    Three main component
    - Unusual blood vessels
    - Sheets of smooth muscle
    - Clusters of adipocytes

Angiomyolipoma

- Investigation
  - CT

    The high fat content of the tumor let CT accurately defined the presence of the tumor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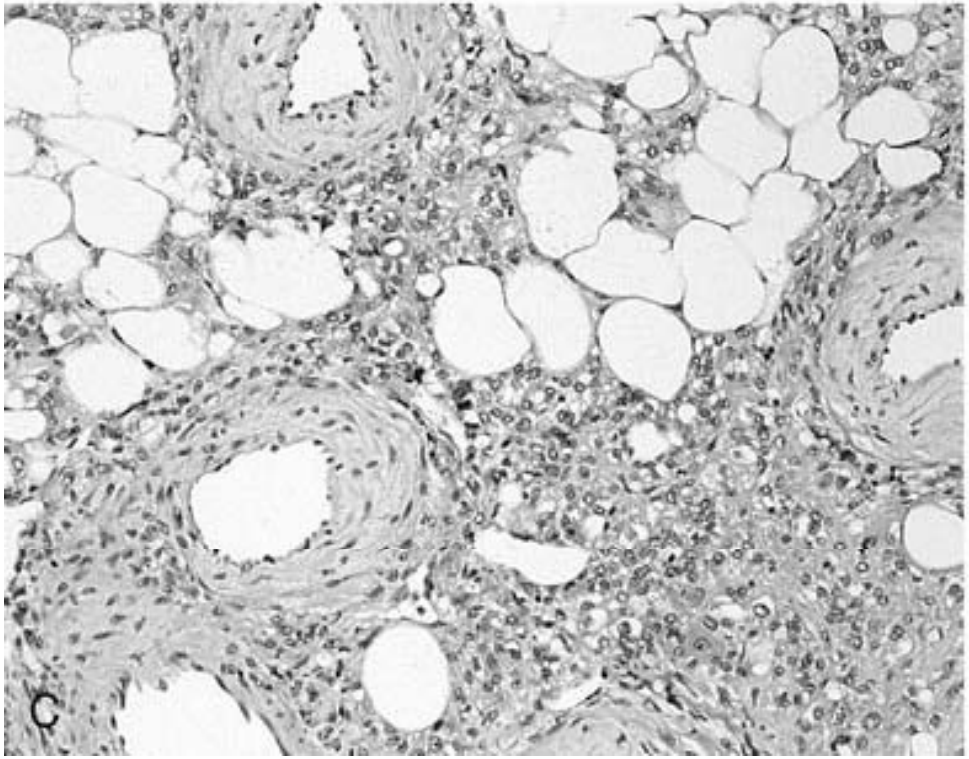
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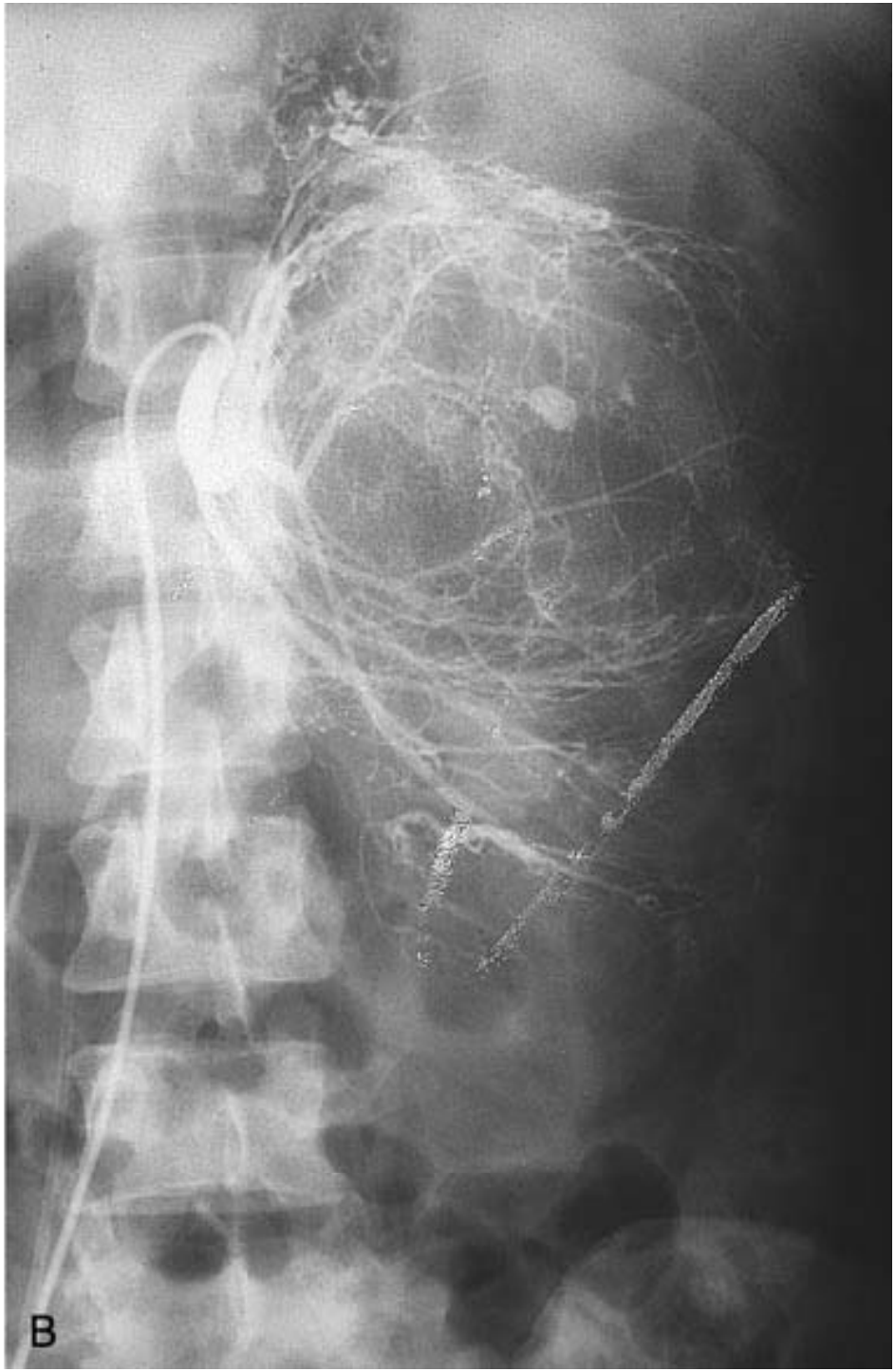
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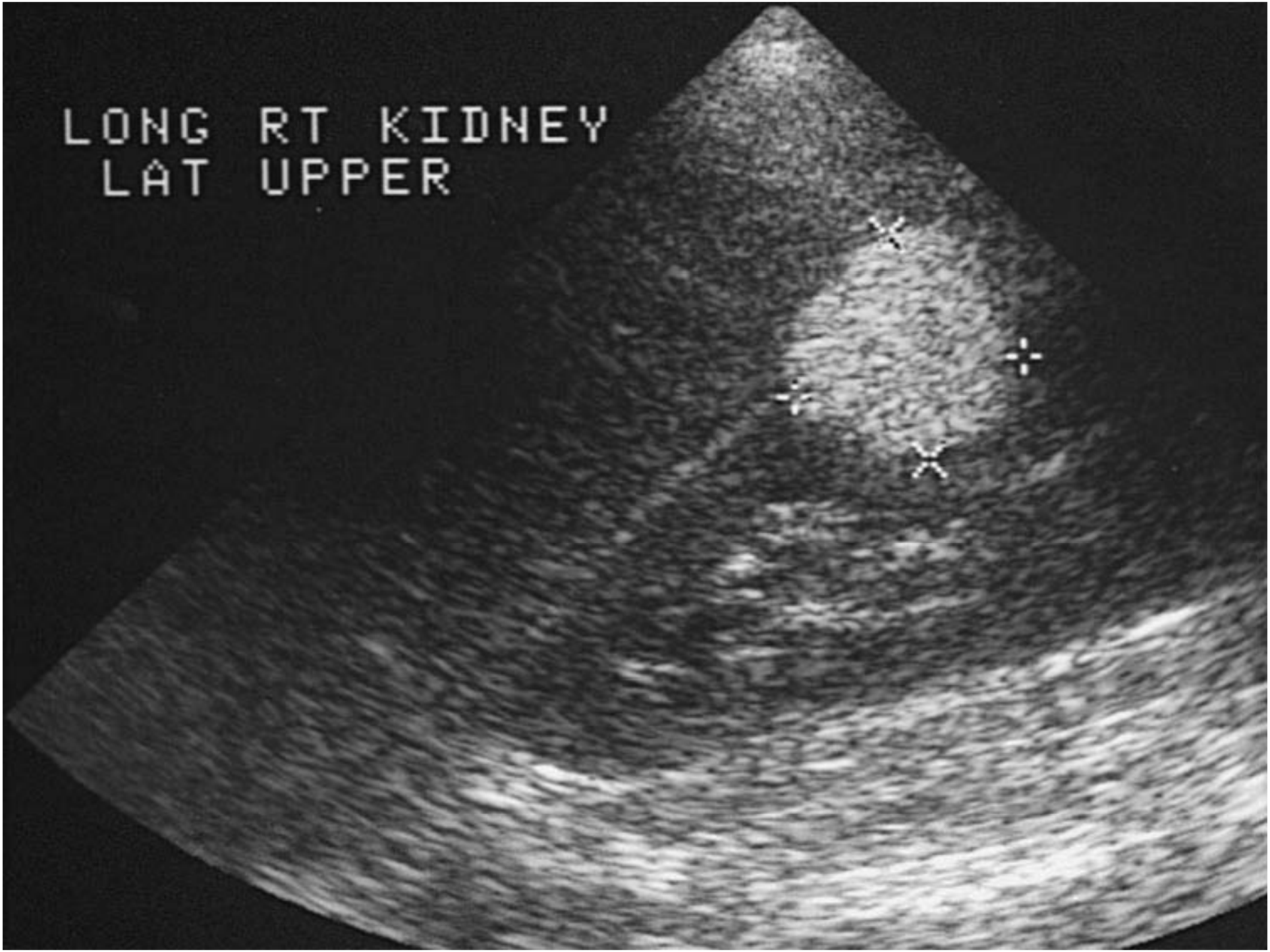

LONG RT KIDNEY
LAT UPPER

Angiomyolipoma

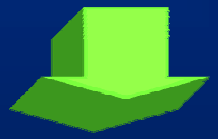
- Presentation
  - Three main types
    - Incidentally in patients undergoing CT for other abdominal problems
    - Large tumors may cause discomfort and GI manifestation due to compression
    - Sudden pain or sever hemorrhage to the retro peritoneum (Wunderlich's syndrome) or to the tumor it self

Angiomyolipoma

- Management

It was found that the size of the tumor is related to the symptoms

Less than 4 cm



Follow up

Persistent symptomatic tumors of any size

Selective embolization

NSS

Angiomyolipoma

Most patients with acute or potentially life-threatening hemorrhage require total nephrectomy if explored

RENAL CELL CARCINOMA

- Incidence
  - 3% of all adult malignancies
  - More than 40% of patients with RCC have died from their cancer
  - Approximately 30,000 new diagnoses of RCC are made each year in the united states, and 12,000 patients die of disease
  - 8.7 new cases are diagnosed per 100,000 population per year
  - Male-to-female predominance of 3 to 2

RENAL CELL CARCINOMA

- **Incidence**
  - **Disease of the elderly patient, with typical presentation in the sixth and seventh decades of life.**
  - **Incidence rates are 10% to 20% higher in African than Americans for unknown reasons**
    - **3% of all adult malignancies**
    - **More than 40% of patients with RCC have died from their cancer**
    - **Approximately 30,000 new diagnoses of RCC are made each year in the united states, and 12,000 patients die of disease**
    - **8.7 new cases are diagnosed per 100,000 population per year**
    - **Male-to-female predominance of 3 to 2**
    - **; the NCI estimates that only 4% are familial.**

RCC……Etiology

- Although a number of potential etiologic factors have been identified in animal models, no specific agent has been definitively established as causative in human RCC
- The only generally accepted environmental risk factor for RCC is tobacco use, ranging from 1.4 to 2.3 when compared with controls.

RCC…….Pathology

- **Gross**
  - Unilateral or bilateral (2%)
  - Rounded ,varying in size from few cm to tumors which fills the abdomen
  - It has no true histologic capsule but pseudo capsule of compressed fibrous tissue and renal parenchyma
  - Varying degree of hemorrhage and necrosis

RCC……Pathology

- Gross
  - Areas of yellowish or brownish soft tissue are alternating with areas of hge and necrosis
  - Calcification may be stibbled or palque like
  - Pelvicalyseal system always displaced but may be involved
  - Gerota's fascia represent a barrier against local spread but may be compressed and invaded
  - Renal vein may be invaded and may be propagated to IVC

RCC……Pathology

- Microscopic
  - Site of origin
    - Proximal convoluted tubules
  - 5 histologic types
    - Clear cell type
    - Granular cell type
    - Sarcomatoid cell type
    - Tubulo papillary cell type
    - Chromophobe cell type

RCC…..Clinical presentation

- Classic triad (10%)
  - Pain
  - Mass
  - Hematuria
- Pain 41%
- Mass 24%
- Hematuria 38%
- Weight loss ,fever , night sweeting
- Left varicocoele

RCC…..Clinical presentation

- Paraneoplastic syndrome
  - Staufer syndrome 14.4%
- It is non metastatic liver dysfunction
- Increase serum enzymes
- Decrease WBC'S
- Increase prothrombin time
- Fever
- Areas of liver necrosis

After nephrectomy

Normal lever values

RCC….Clinical presentation

- Paraneoplastic syndrome
  - Hypercalcemia 10%
    - Parathormone like substance
    - Skeletal metastasis
    - Increase 1,25 cholecalciferol
  - hypertension37%
    - Increase rennin
    - AV fistula
    - Polycythemia
    - Uretral obstruction
    - Cerebral metastasis

RCC….Clinical presentation

- Paraneoplastic syndrome
  - Polycythemia 3.5%
    - Increase erythropoitien by malignant cells
    - Hypoxia by the tumor
  - Hypoglycemia
  - Cushing syndrome
  - Galactorrhea
  - Protien enterapathy
  - Females ⇒ hirsutism and ammenotthea
  - Males ⇒ loss of libido and gynecomastia

RCC……Investigation

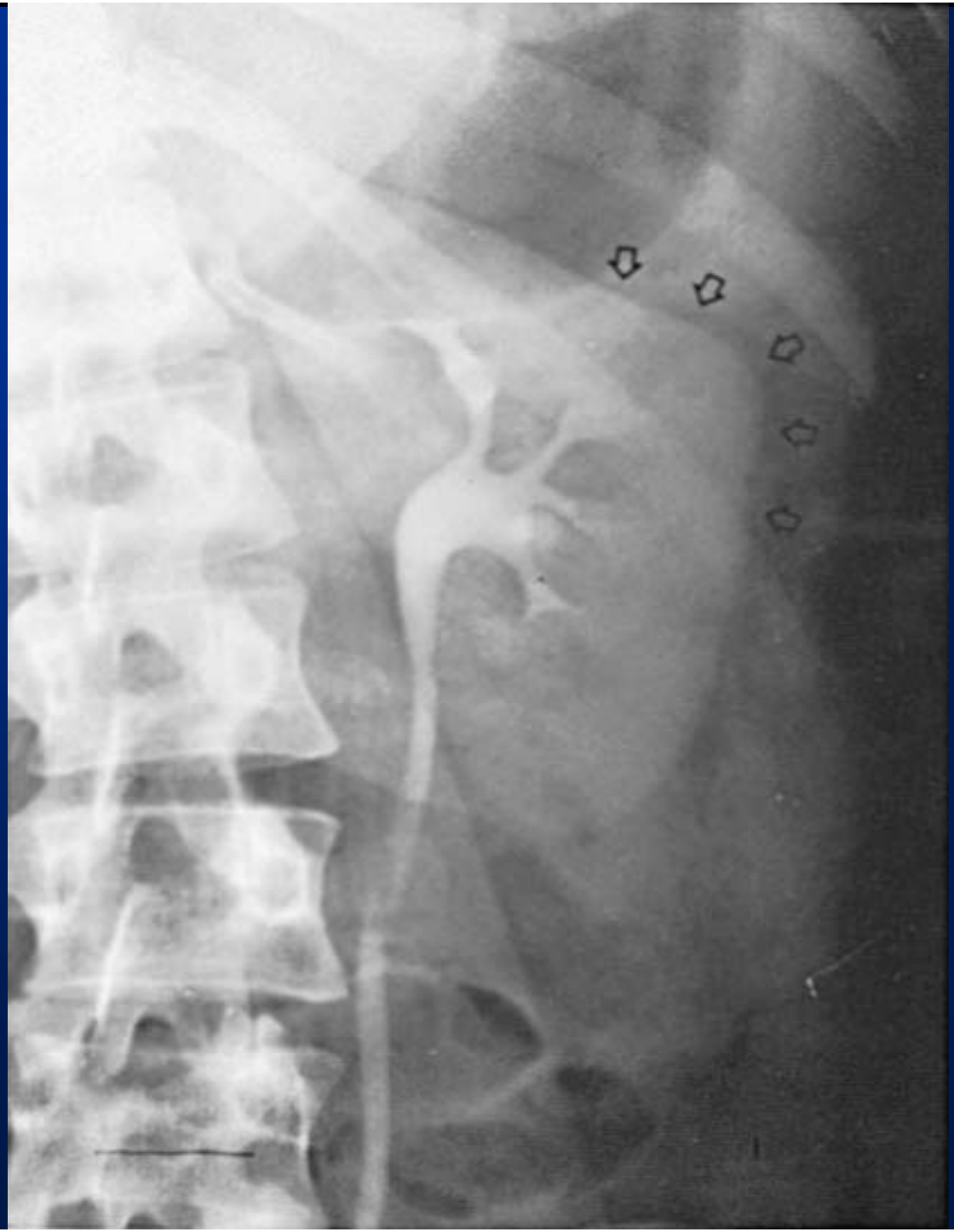
- Radiological
- Lab.
- Fine needle aspiration and biopsy

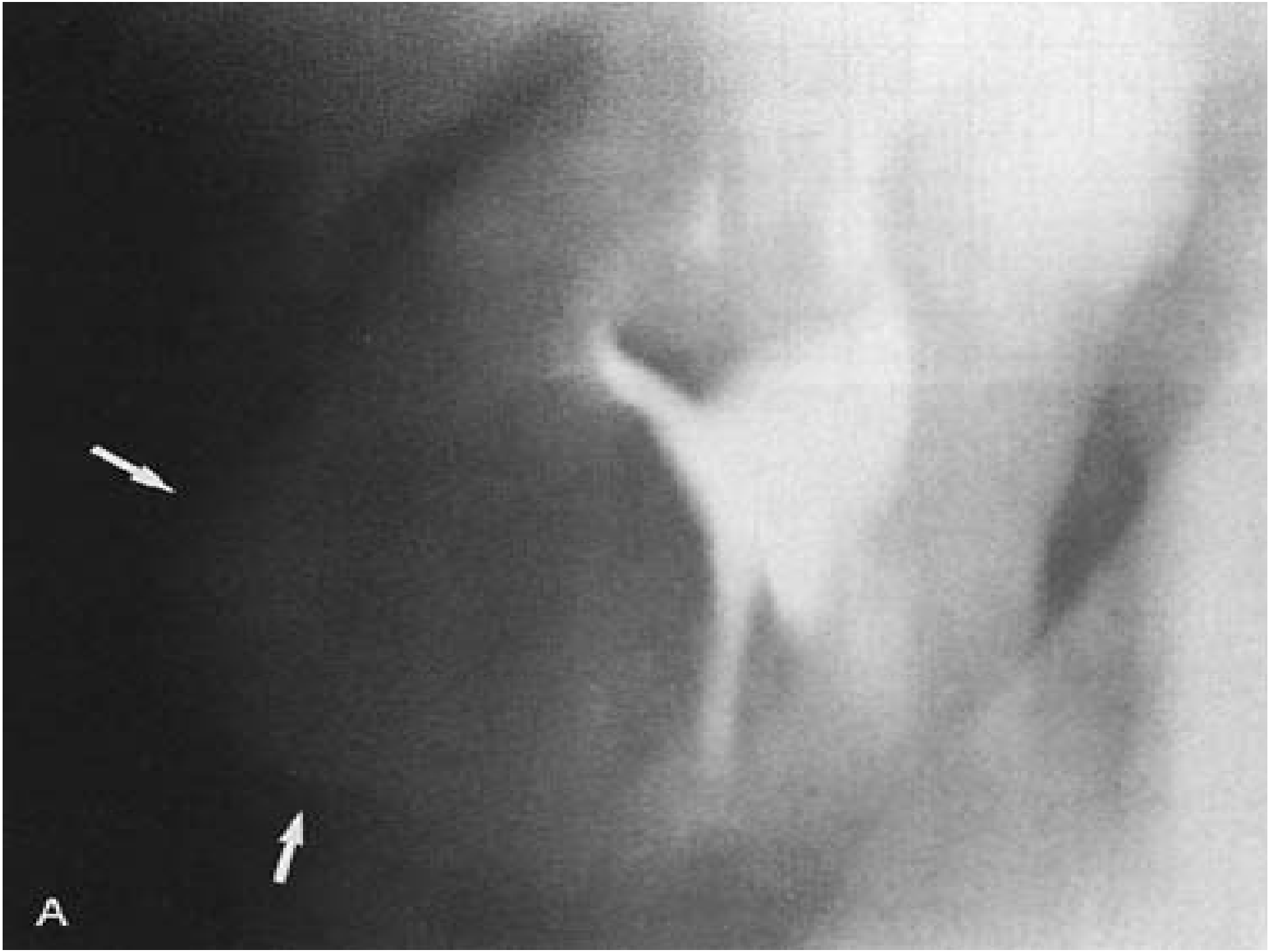
RCC……Investigation

- Radiology…KUB
  - Enlarged renal shadow with distorted contour
  - Calcification
  - Absent psoas boarder

RCC……Investigation

- Radiology….IVP
  - Nephrogram phase ⇨ Enlarged shadow
  - Calyces are distorted ,stretched, elongated or amputated
  - Failure to visualize part due to compression of a part
  - Compression of the ureter ⇨ hydronephrosis
  - Non visualization due to renal vein thrombosis or total infiltration

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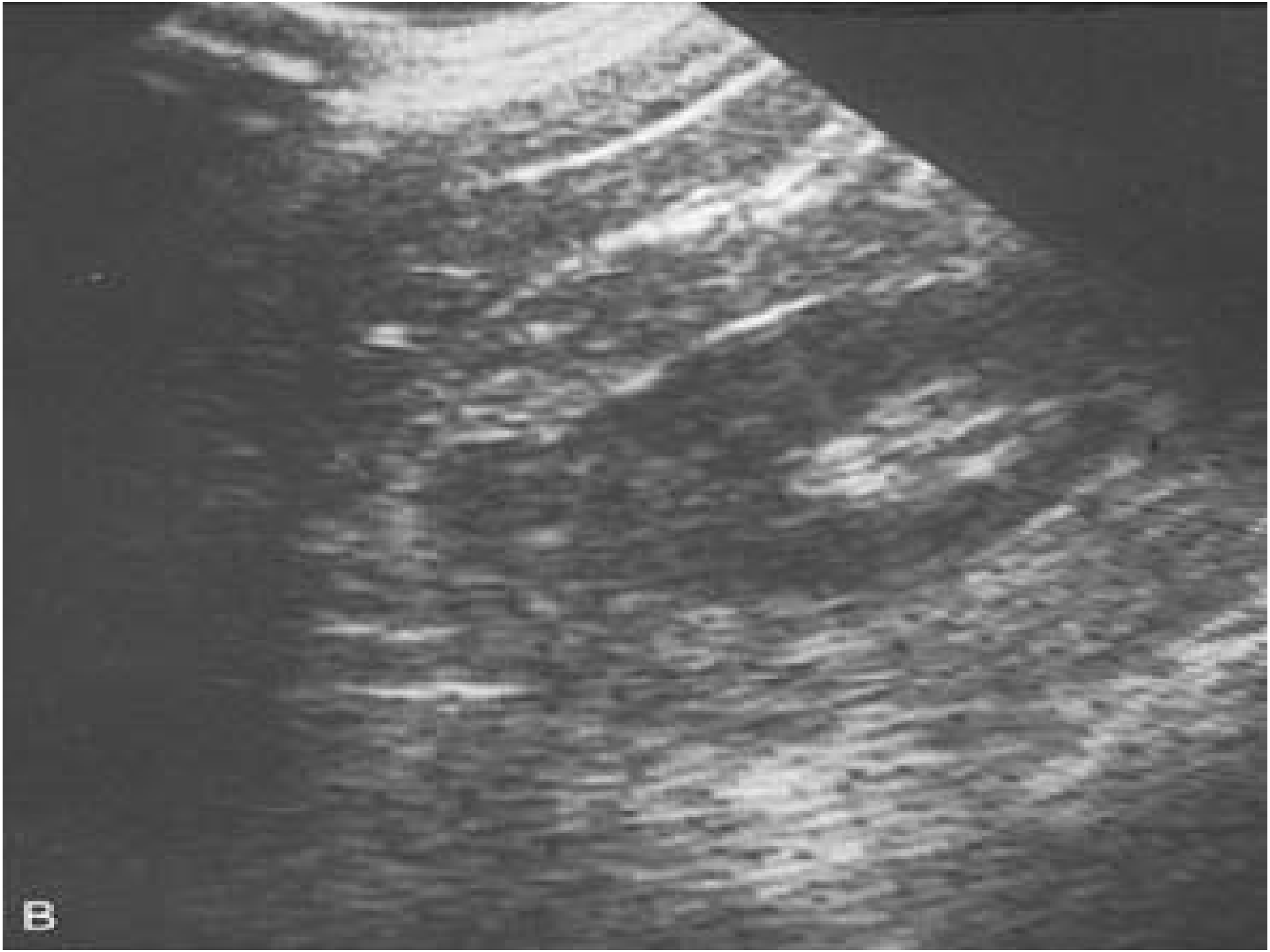
RCC……Investigation

- U/S
  - Solid echogenic mass
  - Venous extension
  - RPLN
  - Liver metastasis
  - P.C aspiration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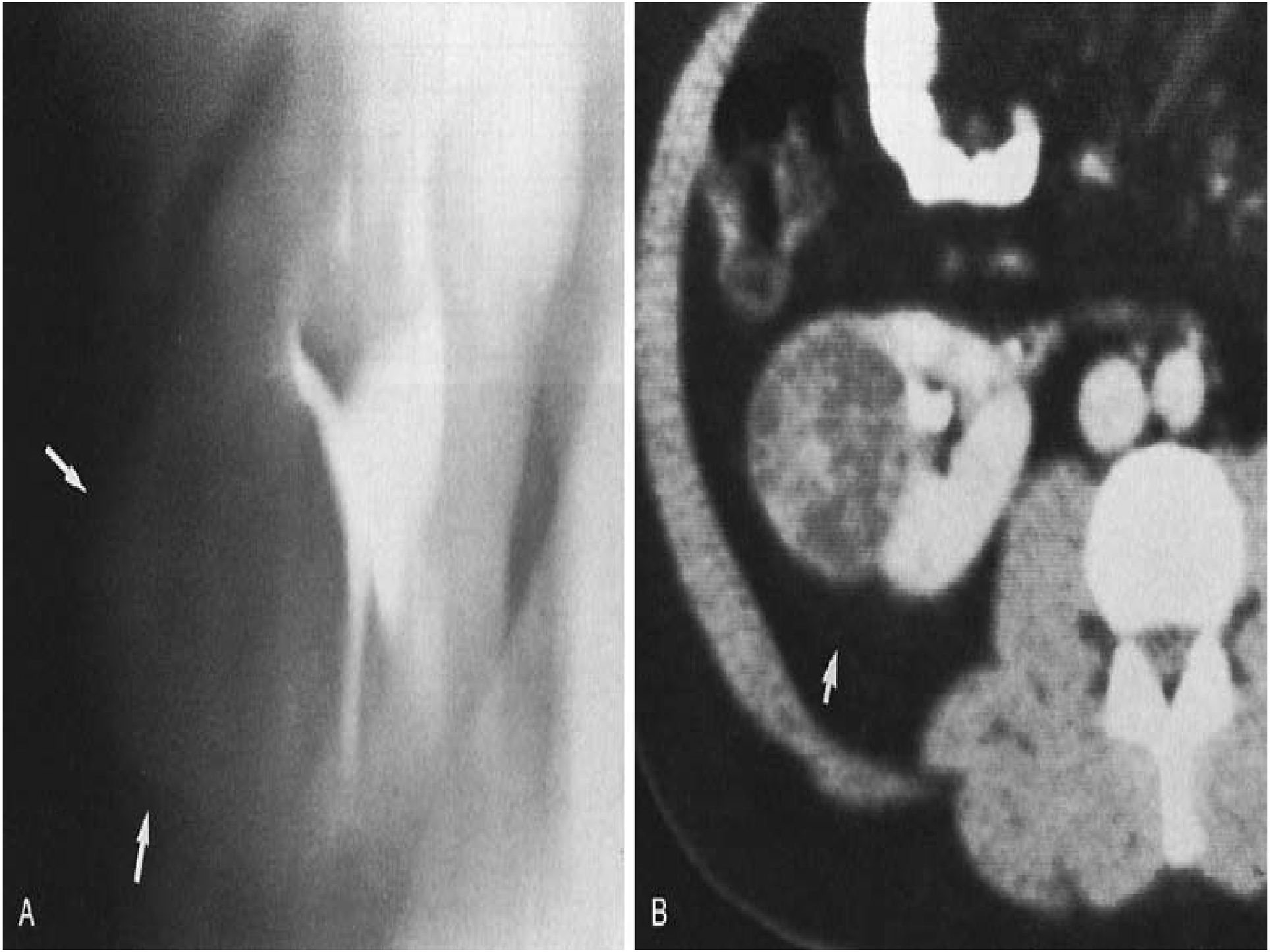
AYO CLINIC
LT Kidney
B

RCC……Investigation

- C.T
  - The single coast effective
  - Accurate diagnosis
  - Density of the solid lesion
  - Staging (liver ,L.N,R.V,IVC)
- Drawback
  - False positive invasion
  - Will not detect limited LN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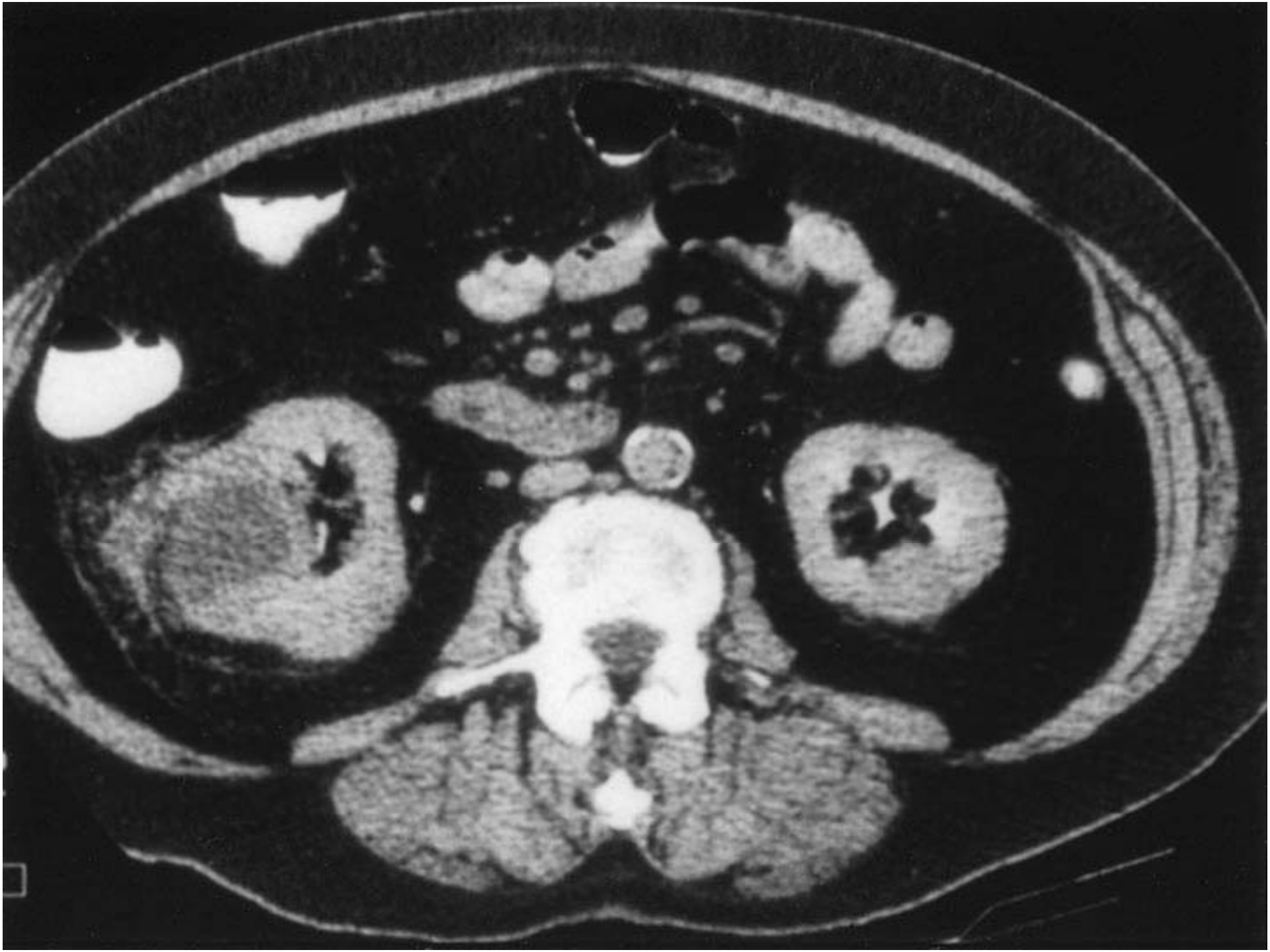

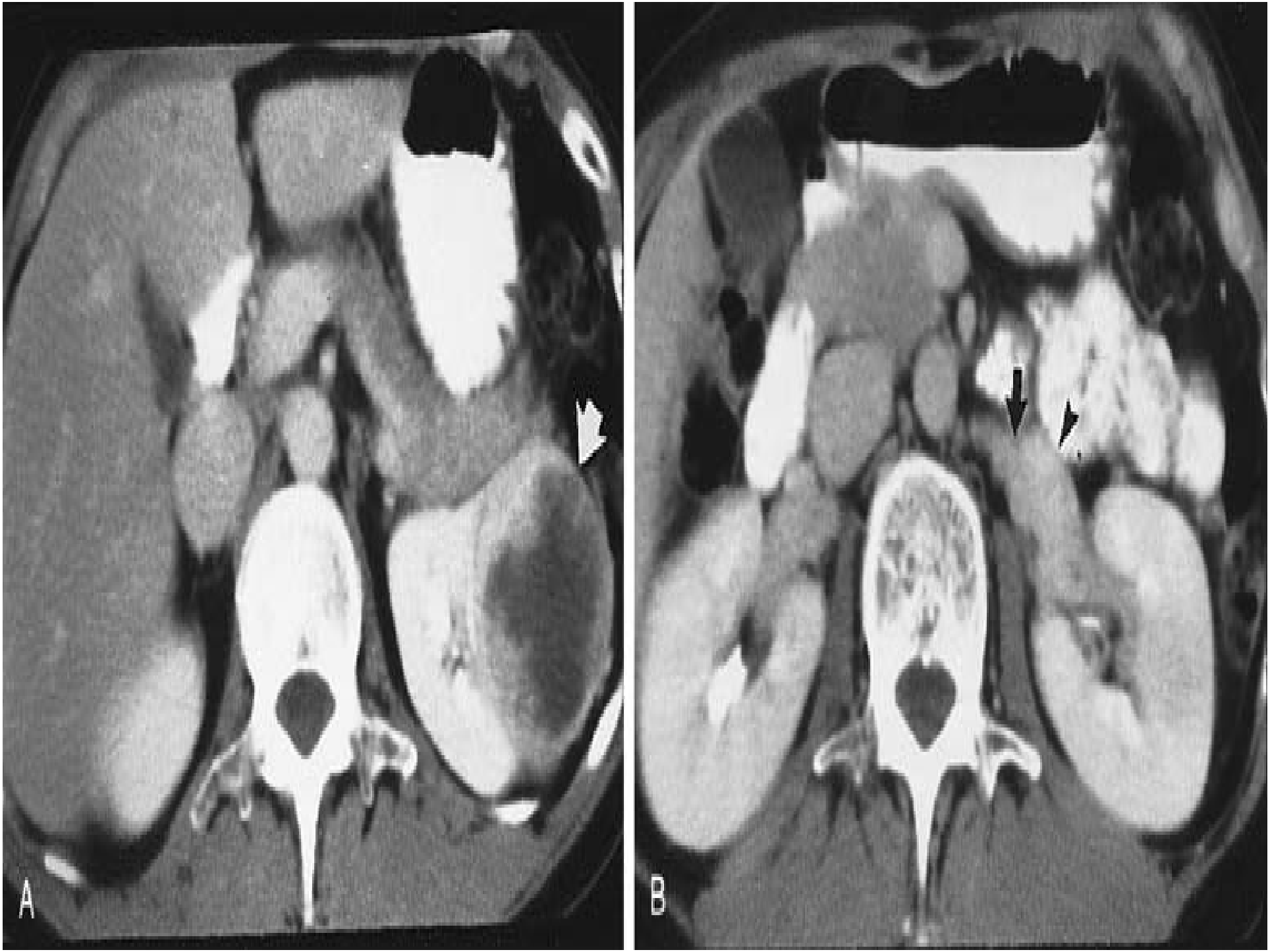
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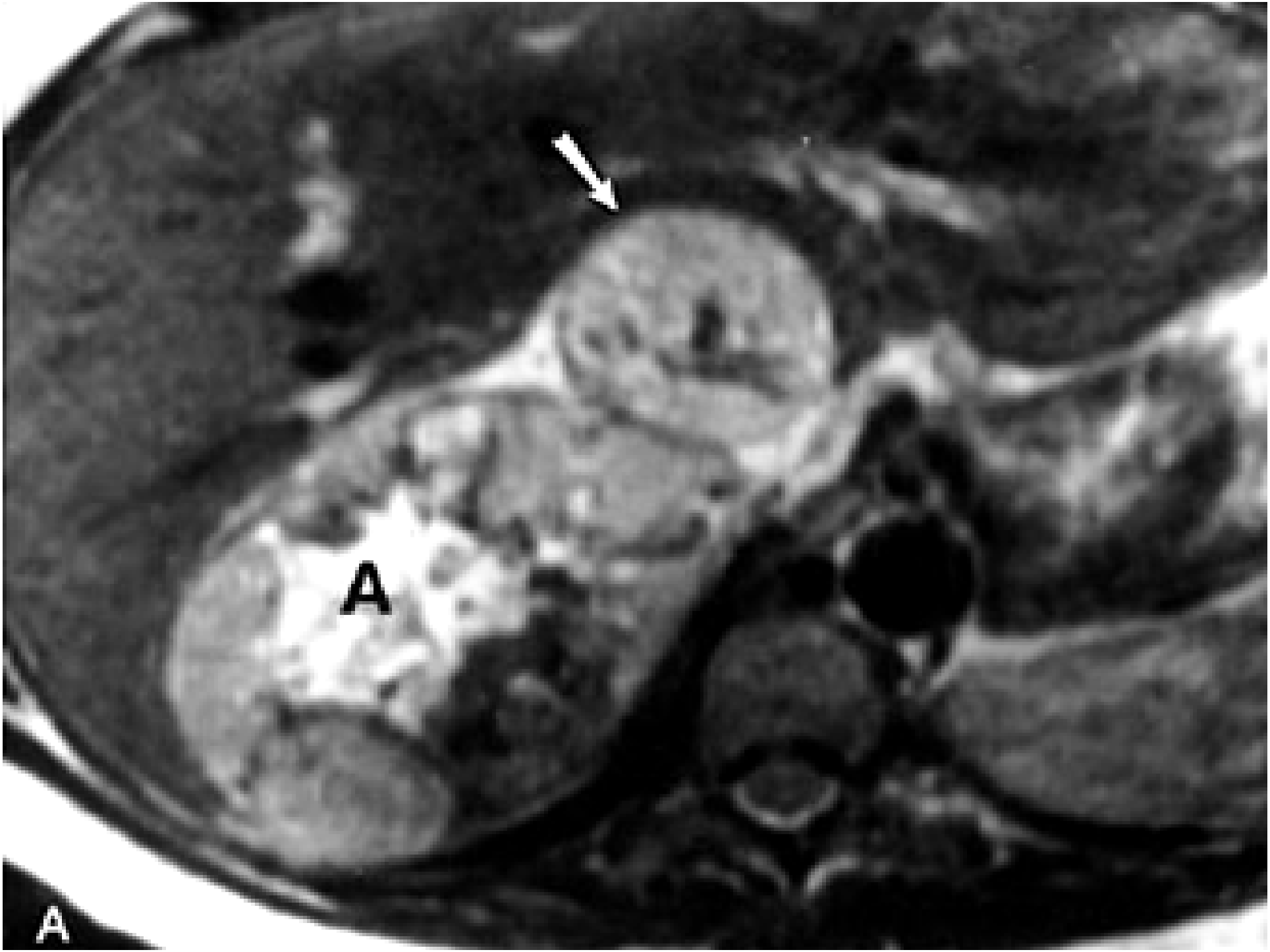
RCC……Investigation

- MR
  - Better than CT in
    - Renal vein and IVC
    - Multidimensional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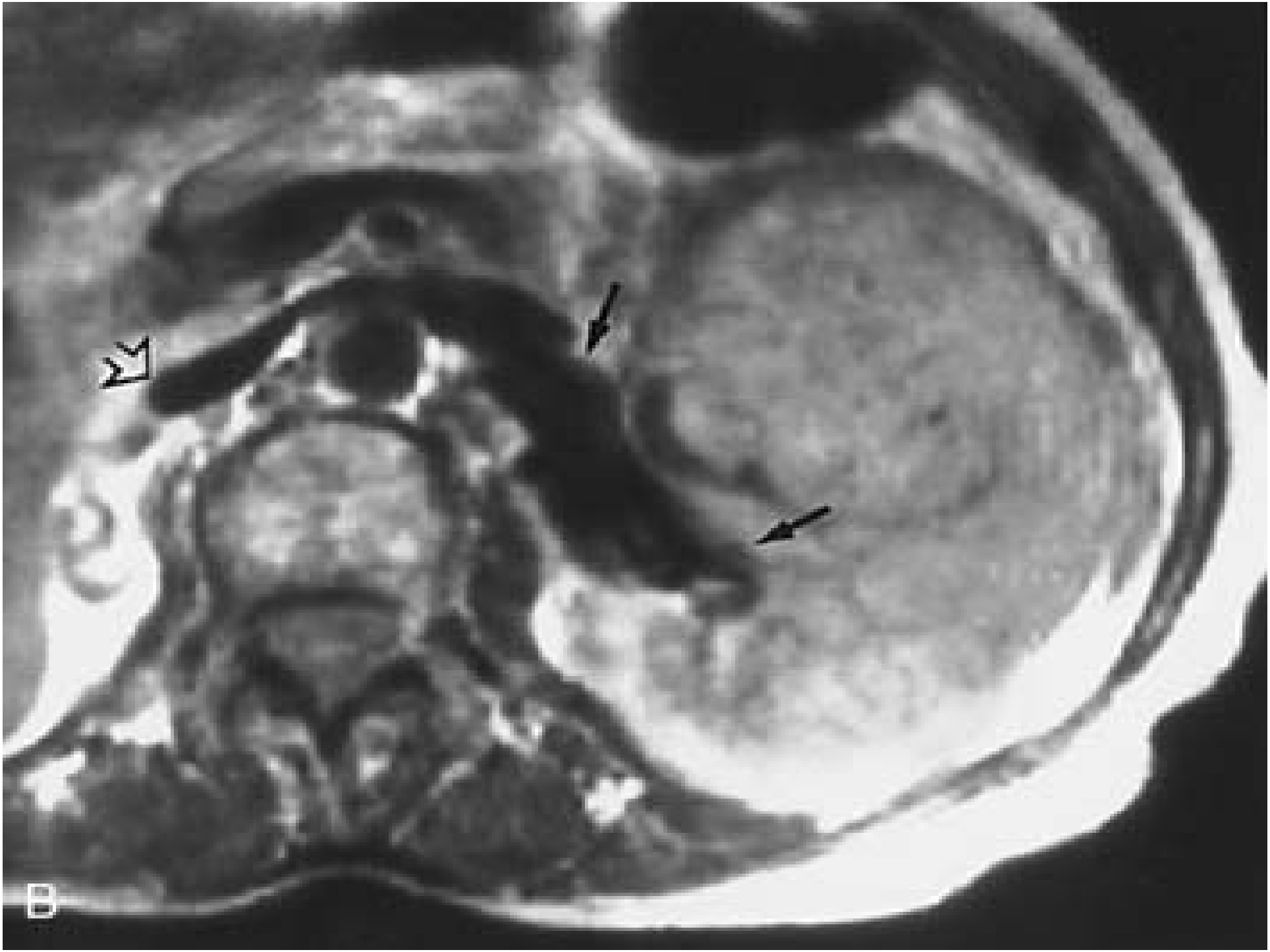
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P37.9*C

RCC……Investigation

- Selective renal angiography
  - Very limited indication
  - Bilateral tumors or in solitary kidney
  - When CT in unclear
  - Before angioinfarction
    - Neovascularity
    - AV fistula
    - Pooling of contrast material
    - Accentuation of capsular vessels

RCC……Investigation

- X ray chest
- Bone scan
- Tumors markers ……non specific
  - CEA and urinary polyamines may be increase
  - Erythropoitin

RCC….Staging

- **Robson**
  - **Stage I**
    - **Tumors within the capsule**
  - **Stage II**
    - **invasion of the perinephric fat but within gerota's fascia**
  - **Stage III**
    - **Main renal vein or IVC**
    - **Regional LN**
    - **Local vessels and LN**
  - **Stage VI**
    - **Adjacent organ rather than adrenal**
    - **Distant metastasis**

RCC….TNM Staging

T: Primary Tumor

TX: Primary tumor cannot be assessed
T0: No evidence of primary tumor
T1: Tumor 7 cm or less in greatest diameter, confined to the kidney
T2: Tumor more than 7 cm in greatest diameter, confined to the kidney
T3: Tumor extends into major veins or invades adrenal gland or perinephric tissues but not beyond Gerota's fascia
T3a: Tumor invades adrenal gland or perinephric tissues
T3b: Tumor grossly extends into renal vein(s) or vena cava below diaphragm
T3c: Tumor grossly extends into vena cava above diaphragm
T4: Tumor invades beyond Gerota's fascia

RCC….TNM Staging

N: Regional Lymph Nodes

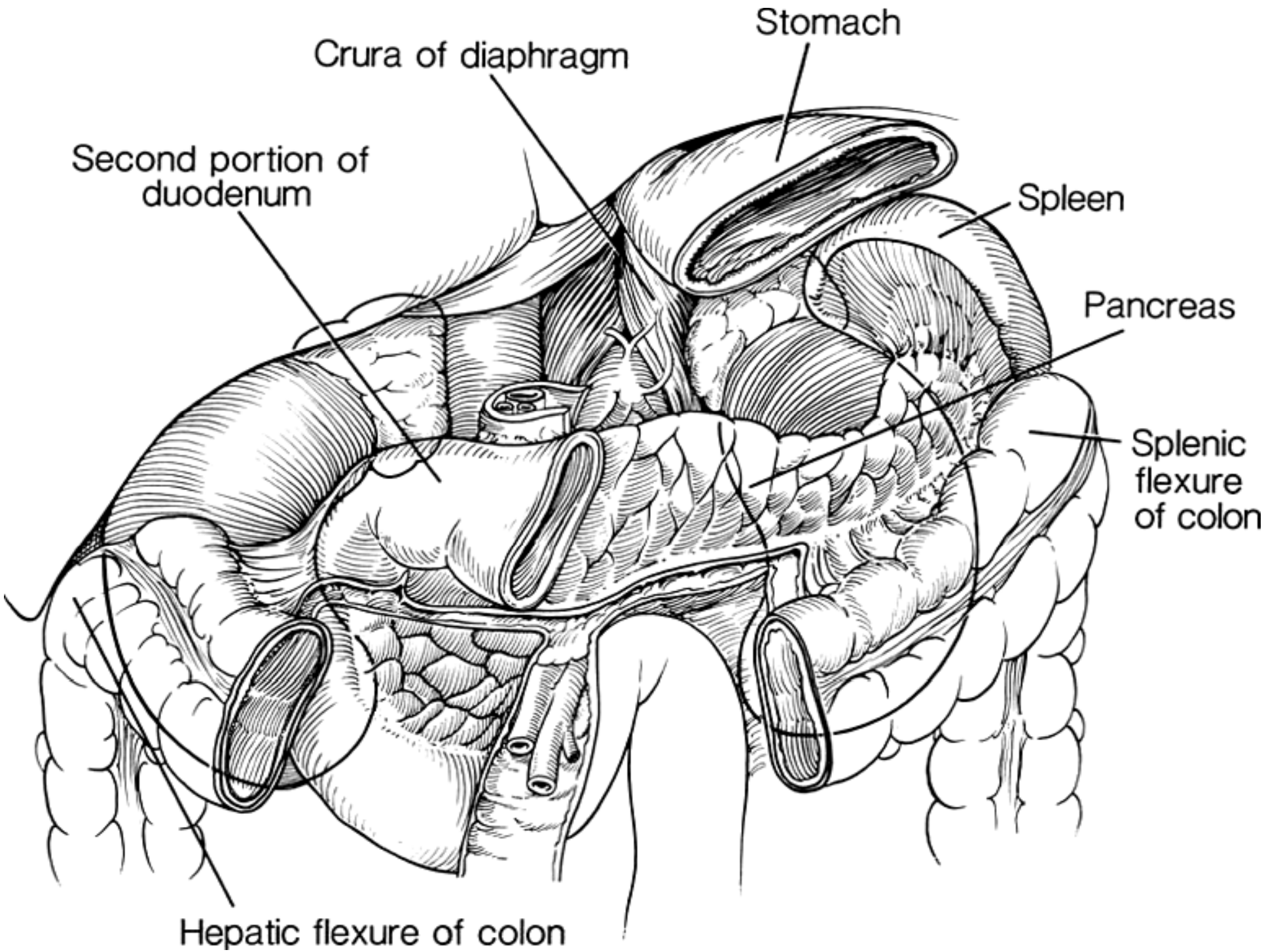
NX: Regional lymph nodes cannot be assessed
N0: No regional lymph node metastasis
N1: Metastasis in a single regional lymph node
N2: Metastasis in more than one regional lymph node

M: Distant Metastases

MX: Distant metastasis cannot be assessed
M0: No distant metastasis
M1: Distant metastasis

Management of RCC

- Open surgery Radical nephrectomy
- Nephron sparing surgery (NSS)
- Laparoscopic surgery


Stomach
Crura of diaphragm
Second portion of duodenum
Spleen
Pancreas
Splenic flexure of colon
Hepatic flexure of colon

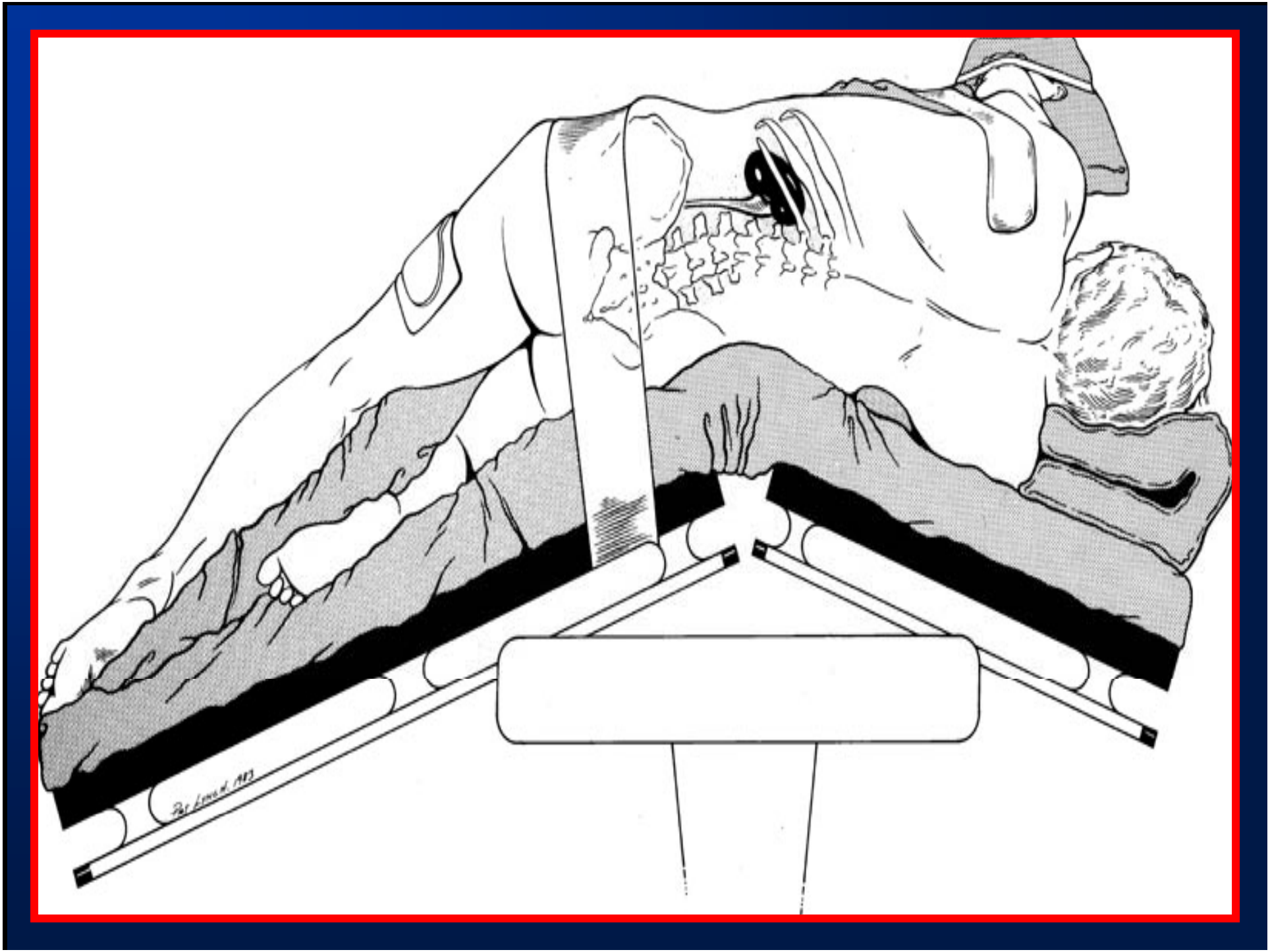
SURGICAL APPROACHES TO THE KIDNEY

- The kidney may be approached for radical nephrectomy by three principal routes:
  - Flank approach
  - Extra-peritoneal flank approach
  - Anterior trans-peritoneal approach
  - Thoraco-abdominal approach

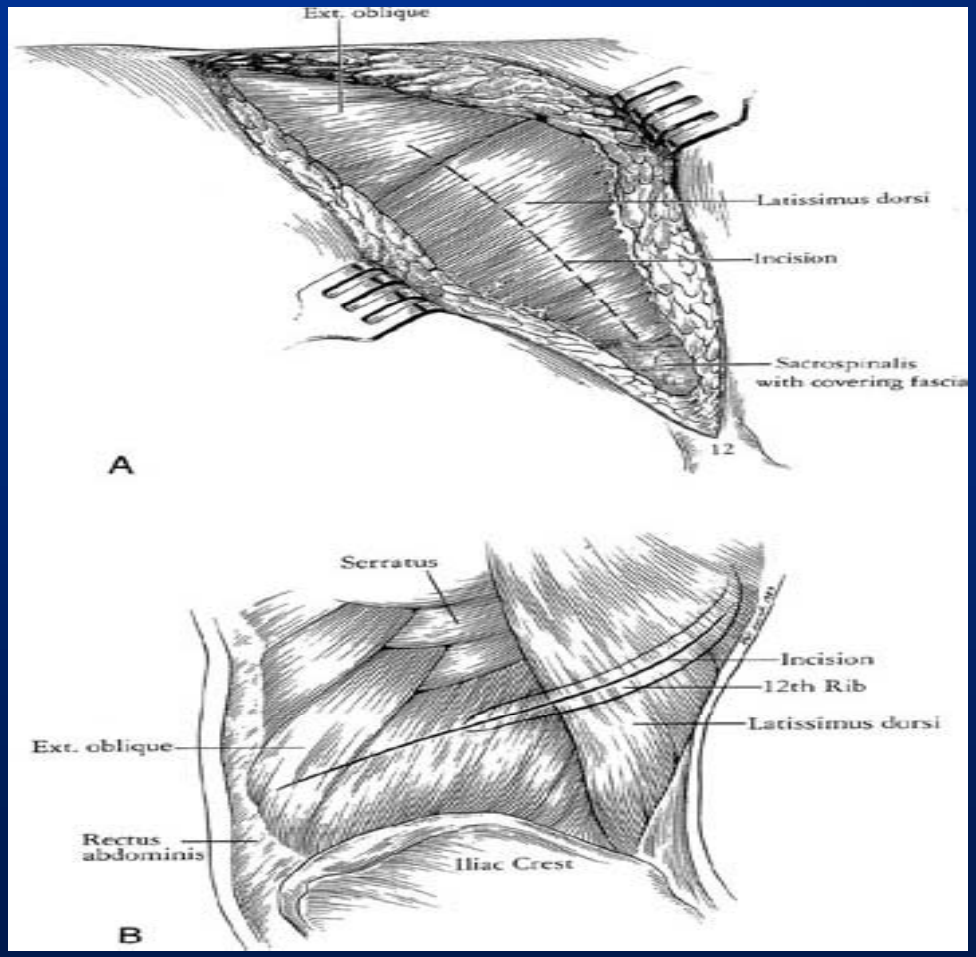
Flank Approach

- The principal disadvantage of the flank incision is that : the exposure in the area of the renal pedicle is not as good as with anterior trans-peritoneal approaches.

- The flank incision may prove unsuitable for the patient with scoliosis or cardio-respiratory problems.

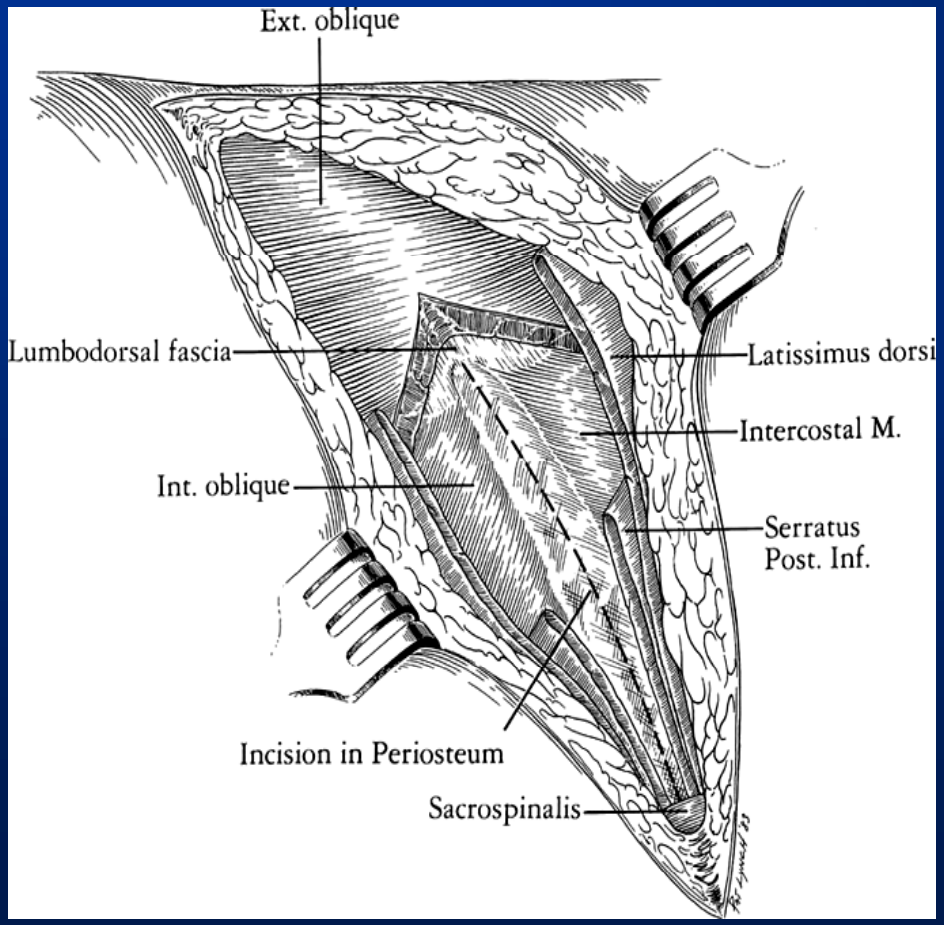


Flank Approach



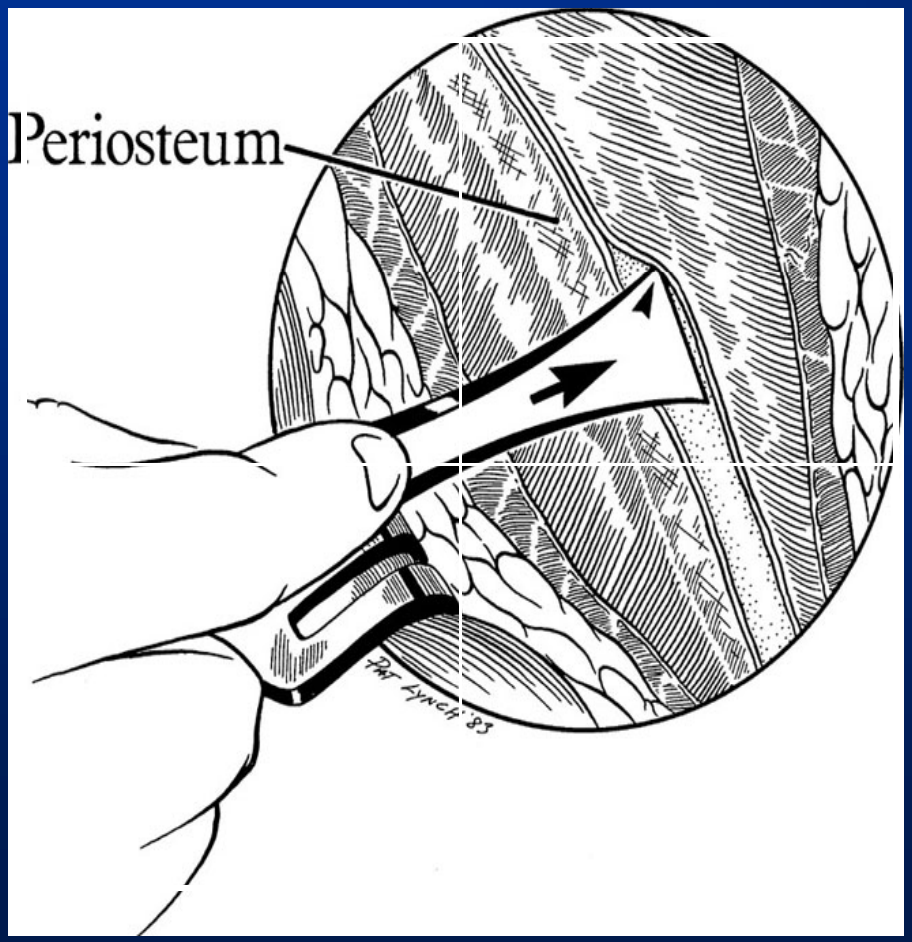
The flank incision is made directly over the appropriate rib, beginning at the lateral border of the sacrospinalis muscle

Flank Approach

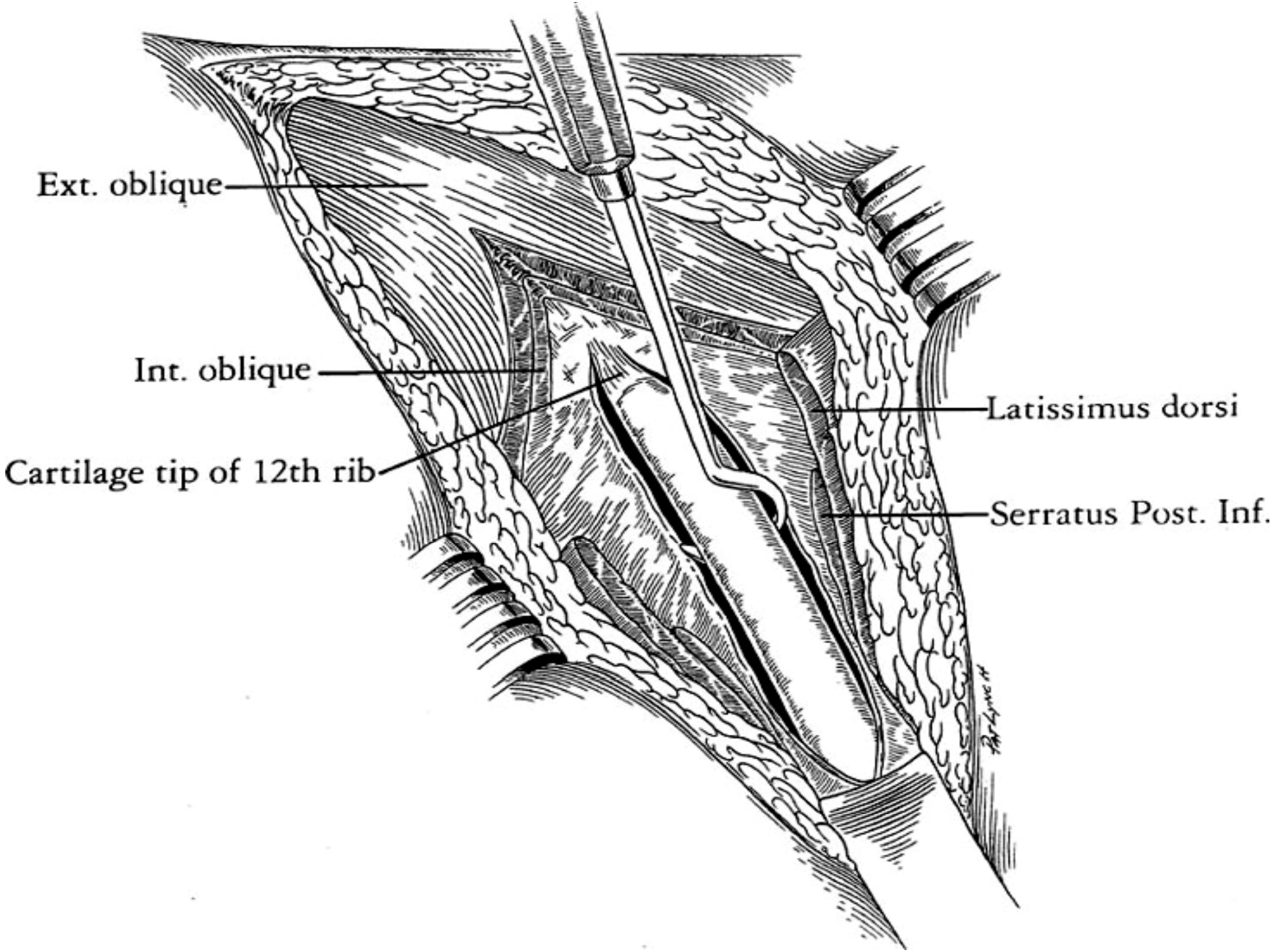


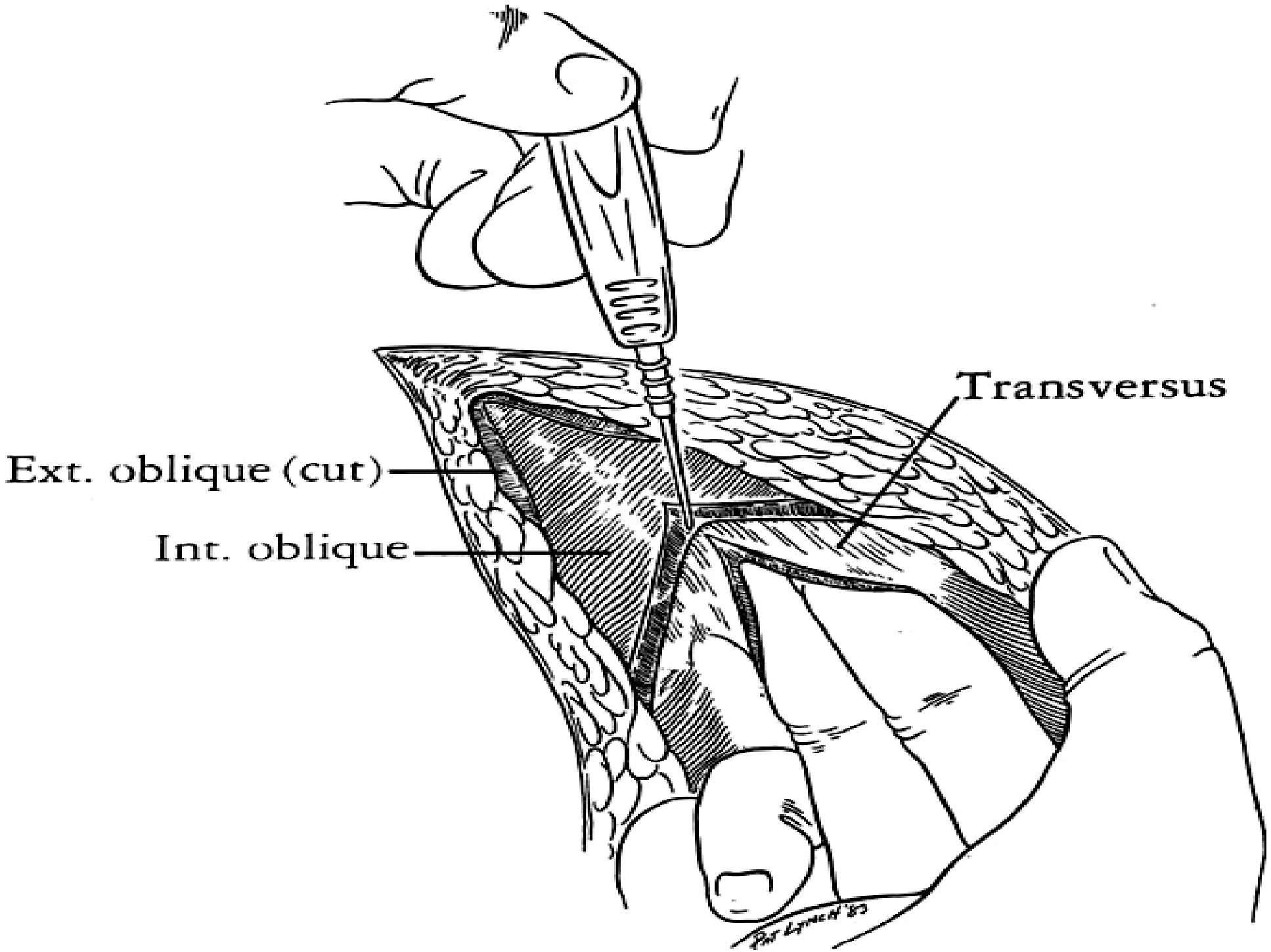
The external oblique and latissimus dorsi muscles and the slips of the underlying serratus inferior posterior muscles are divided

Flank Approach



- The periosteum over the rib is incised with a scalpel or by diathermy.
- The flat periosteal elevator is used to reflect the periosteum off the rib


Ext. oblique
Int. oblique
Cartilage tip of 12th rib
Latissimus dorsi
Serratus Post. Inf.


Transversus
Ext. oblique (cut)
Int. oblique

Anterior Transperitoneal Approach

- Advantage
  - excellent exposure of the renal pedicle
- disadvantage
  - longer period of postoperative ileus is possible
  - long-term complication of intra-abdominal adhesions leading to bowel obstruction.

Standard technique

The most important aspect of radical nephrectomy

Removal of the kidney outside Gerota's fascia

as

capsular invasion with perinephric fat involvement occurs in 25%of patients.

It has been shown that removal of the ipsilateral adrenal gland is not routinely necessary unless the malignancy either extensively involves the kidney or is located in the upper portion of the kidney

Standard technique

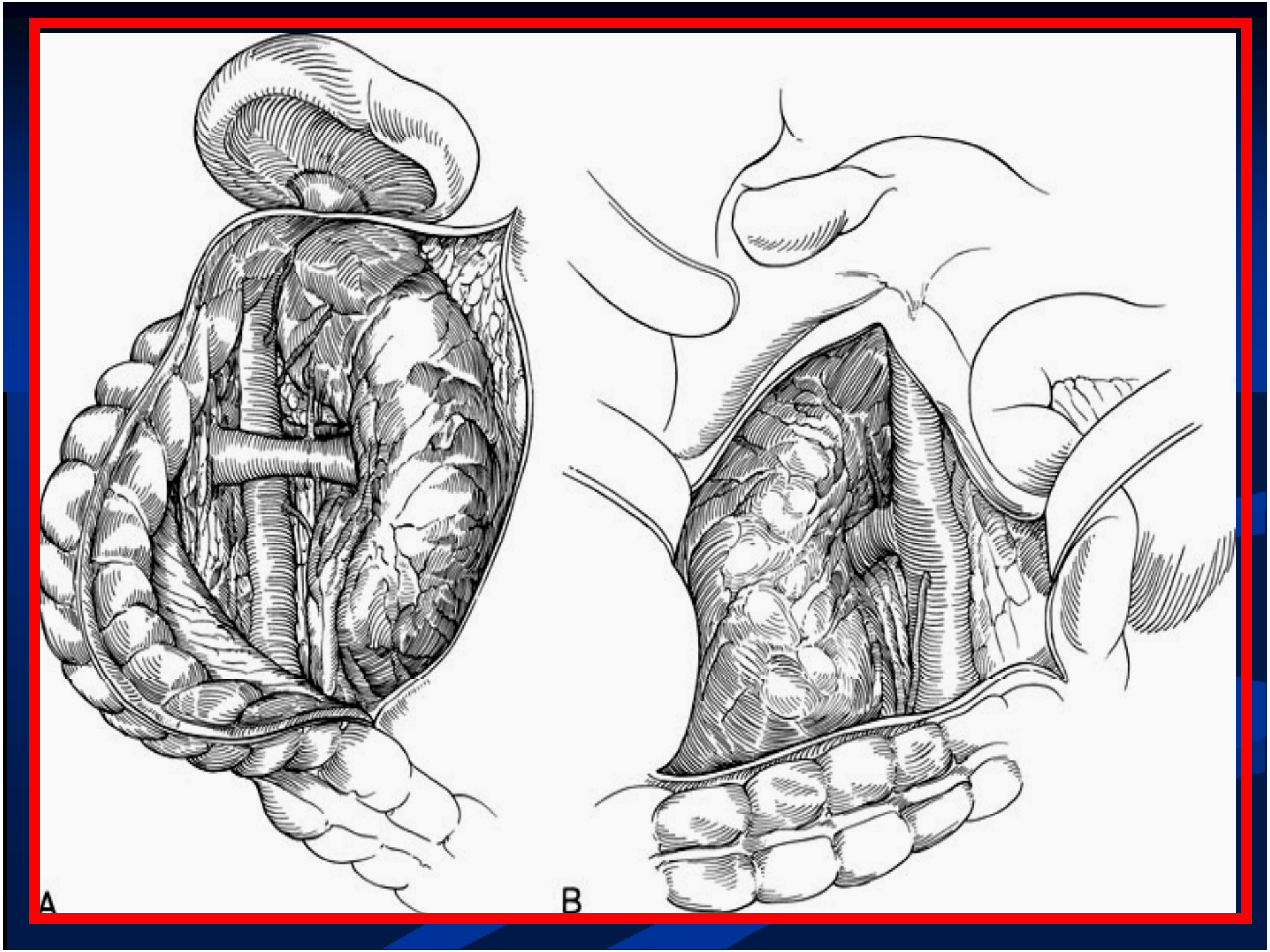
When performing radical nephrectomy through a subcostal transperitoneal incision.

The posterior peritoneum is incised in the paracolic gutter in the avascular Told's line .

Standard technique

- **On the left side**

The colon is reflected medially to expose the great vessels. This is facilitated by division of the spleno-colic ligaments, which also helps to avoid excessive traction and injury to the spleen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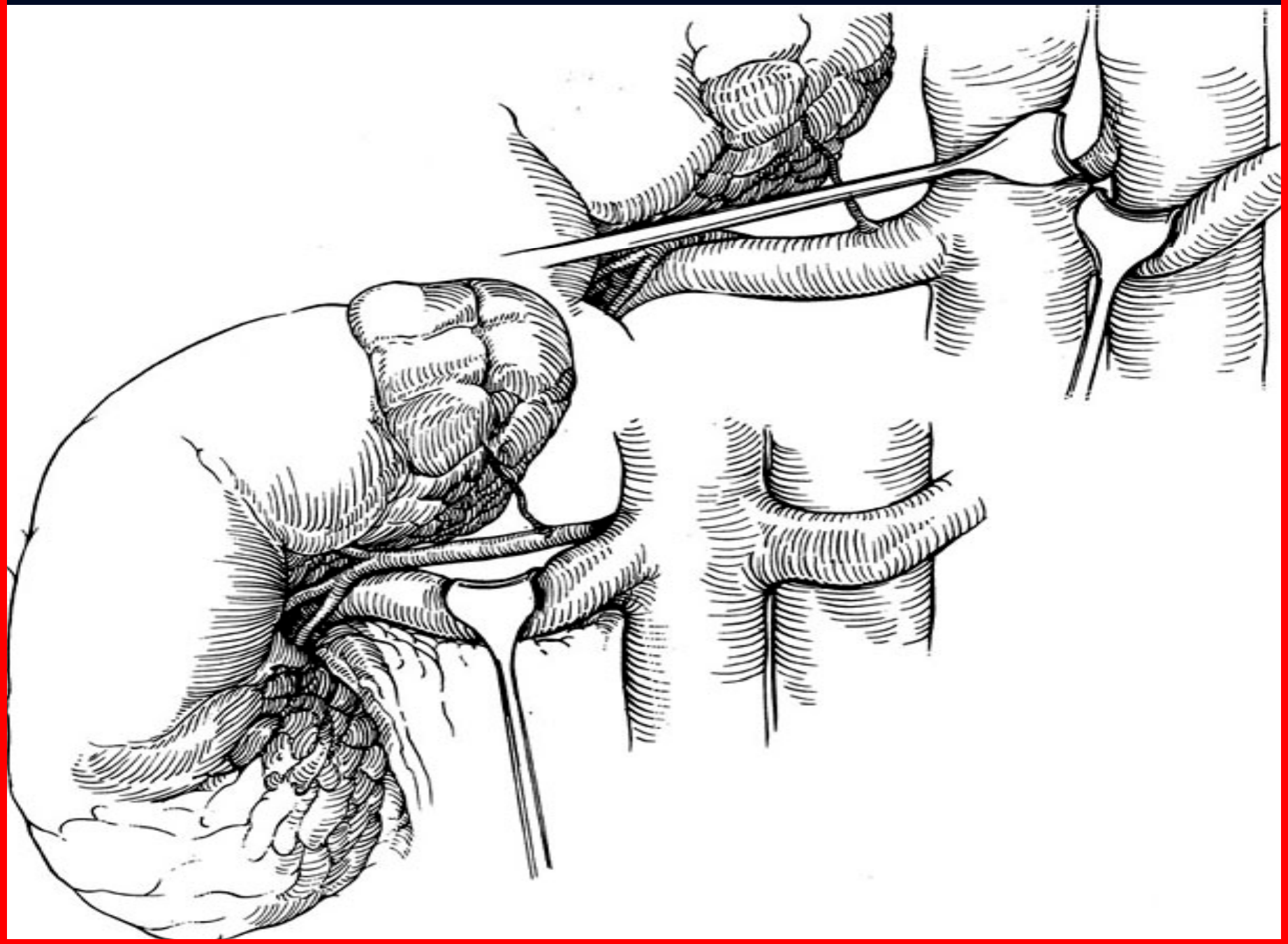
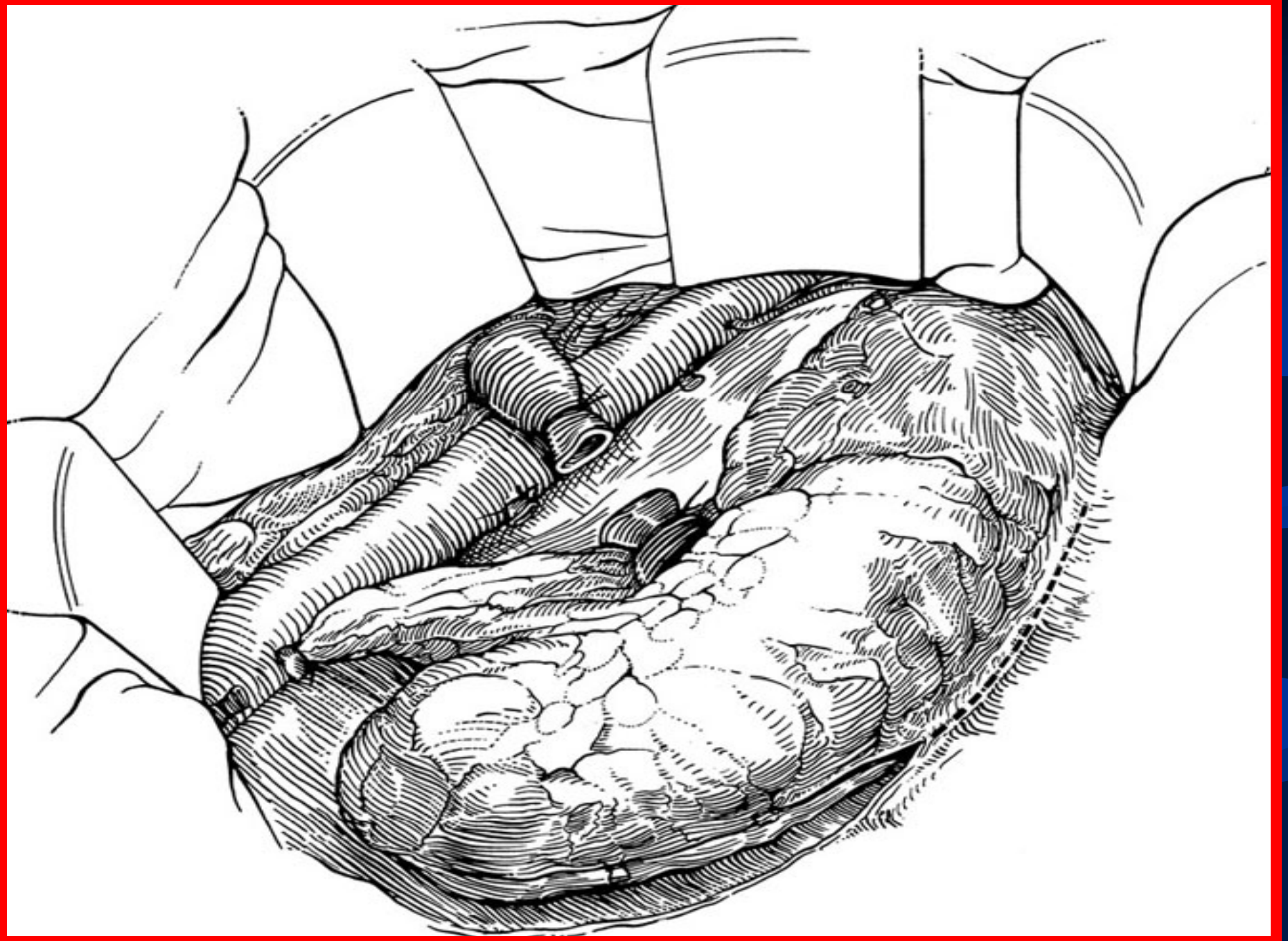
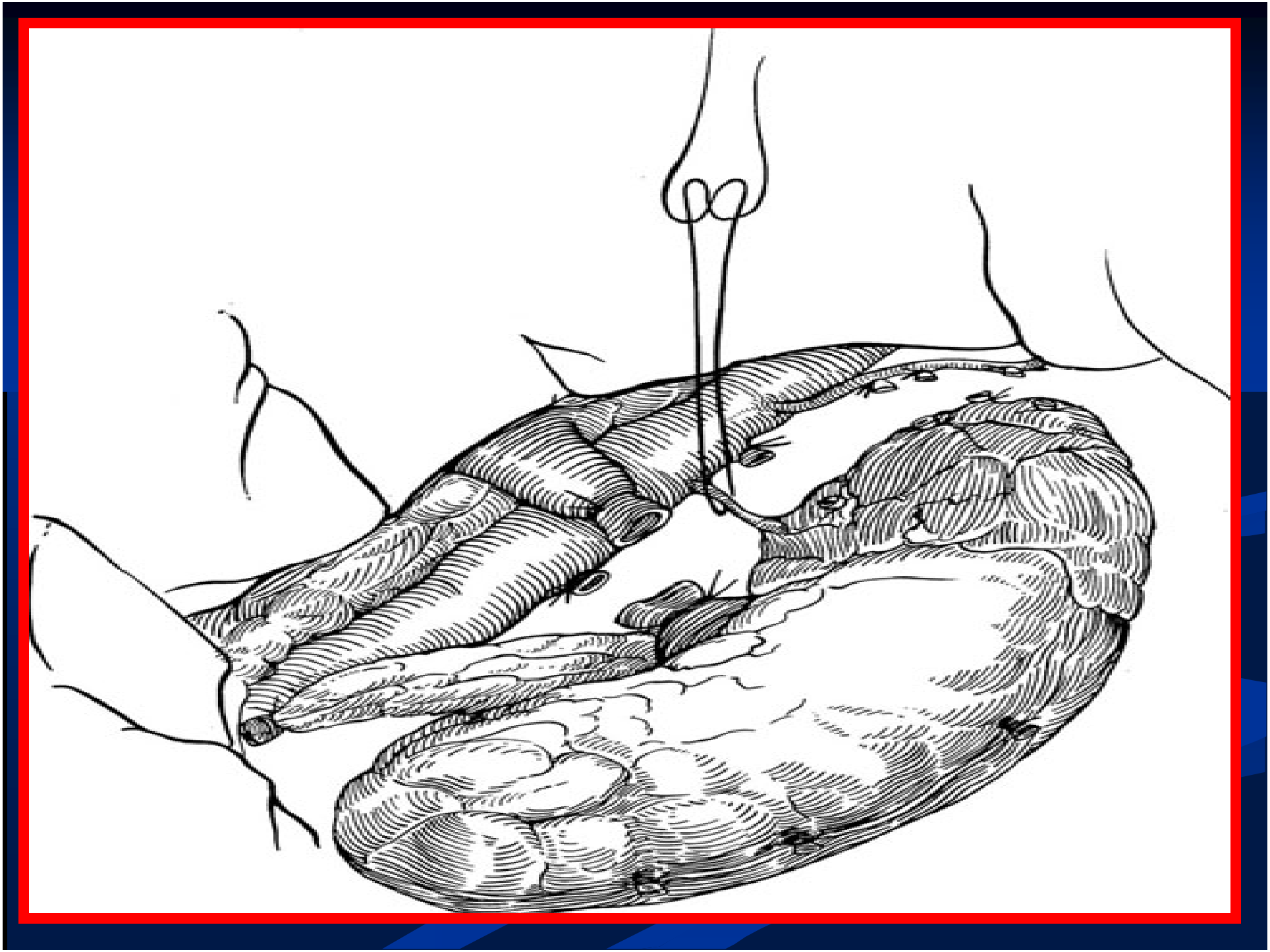
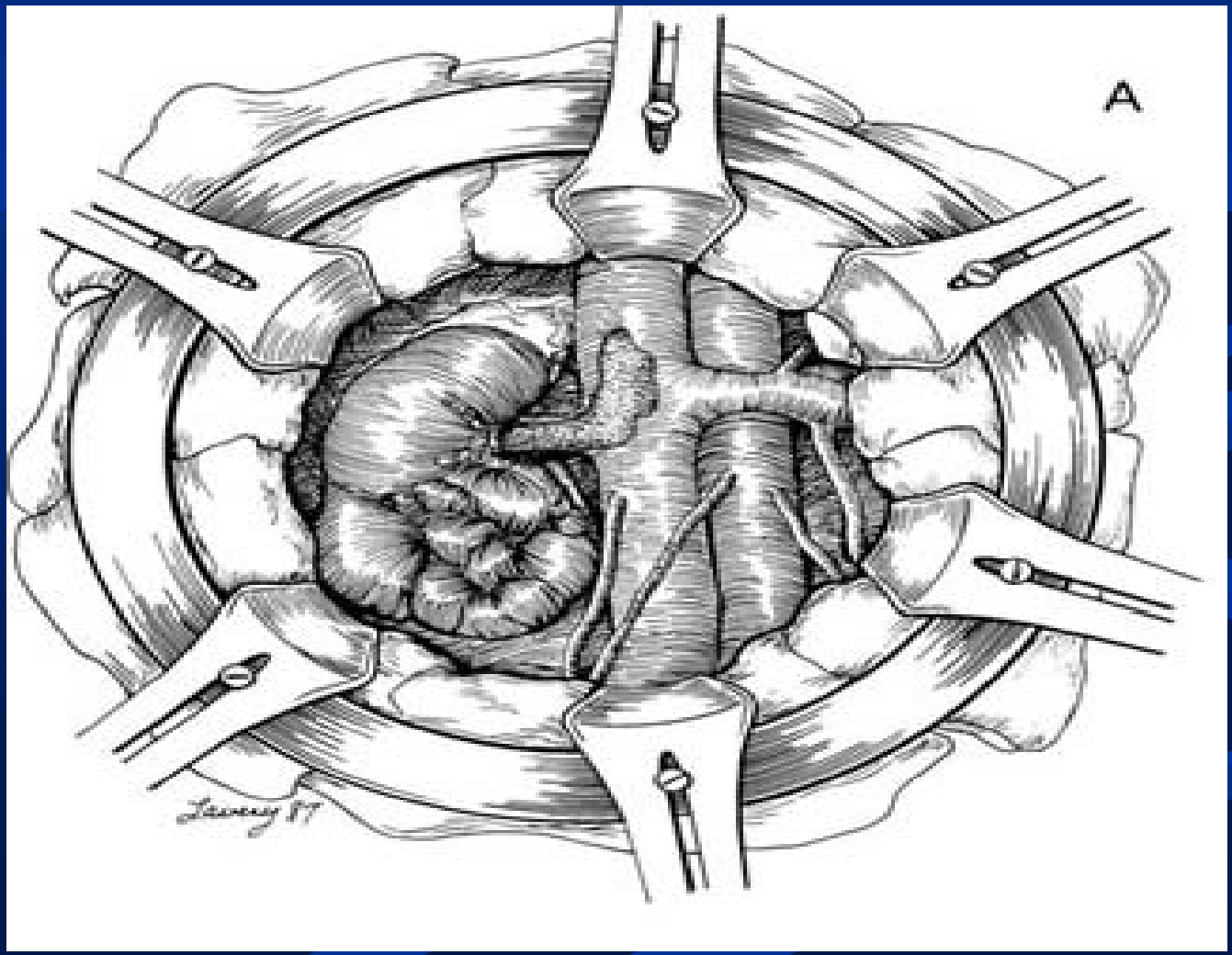


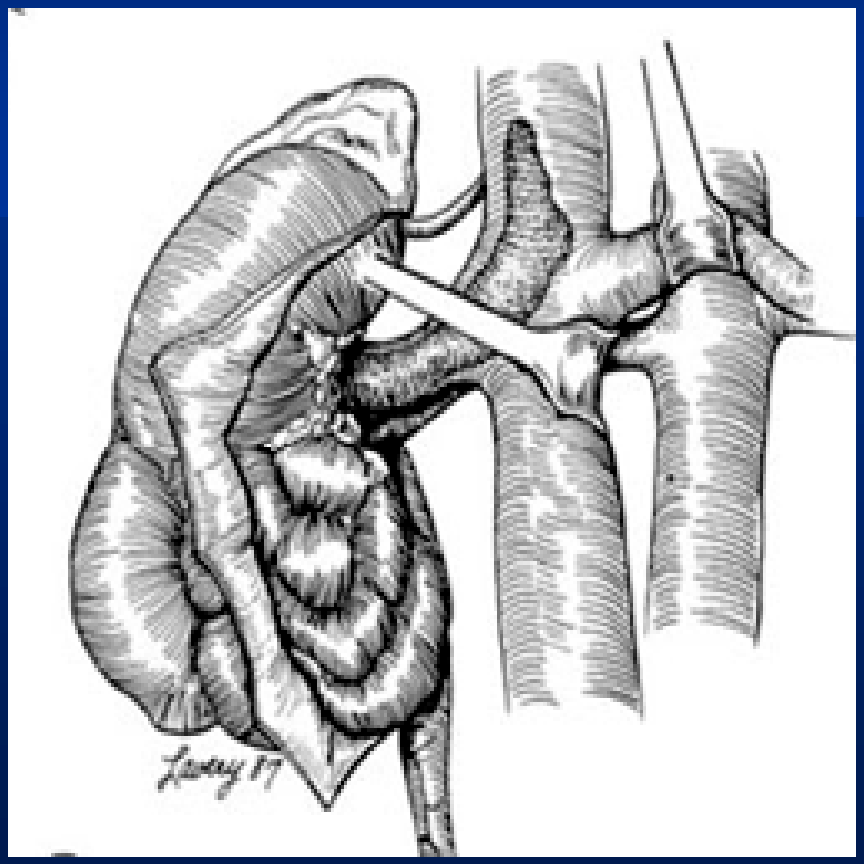




Radical Nephrectomy With Renal Vein And Vena Caval Involvement

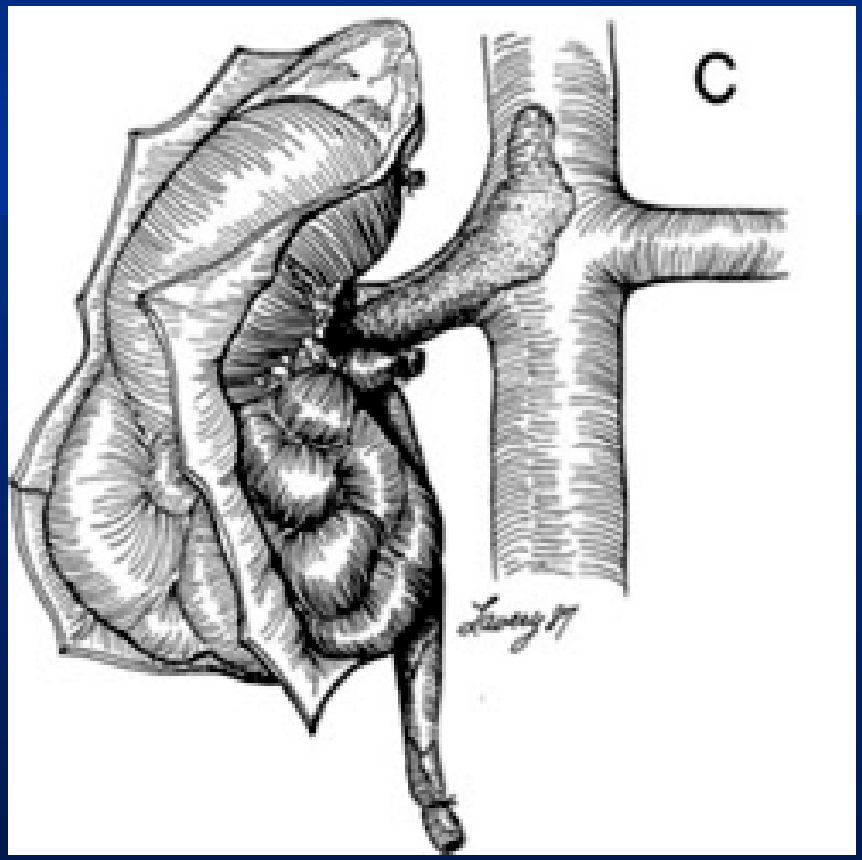


Radical Nephrectomy With Renal Vein And Vena Caval Involvement



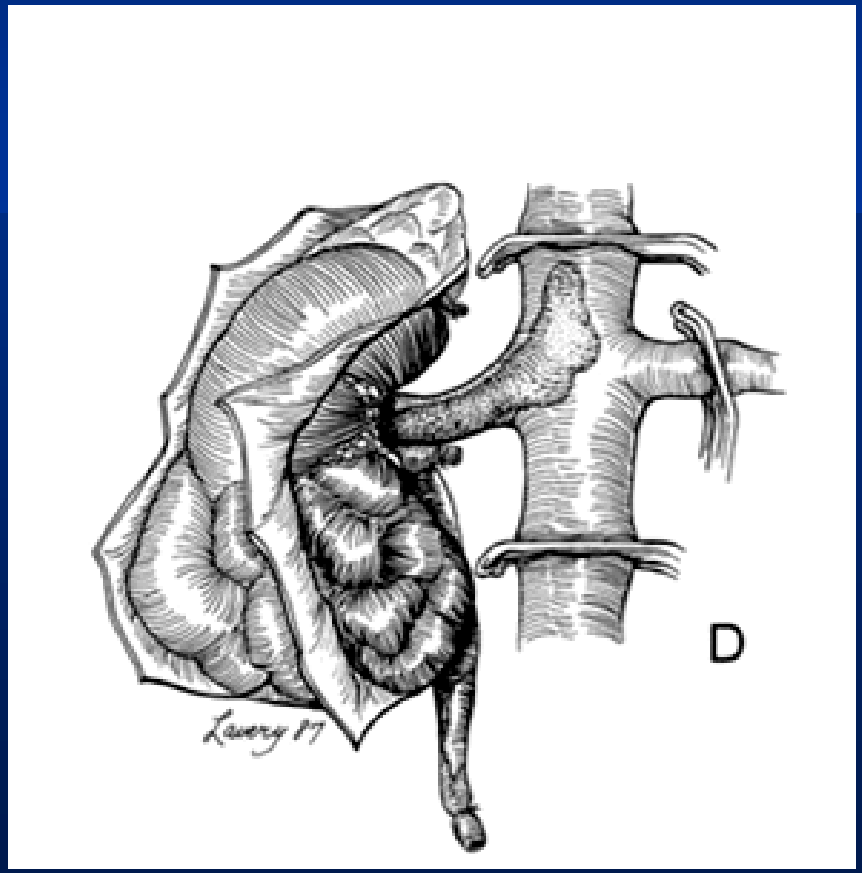
The entire kidney is mobilized outside Gerota's fascia

Radical Nephrectomy with renal vein and vena caval involvement



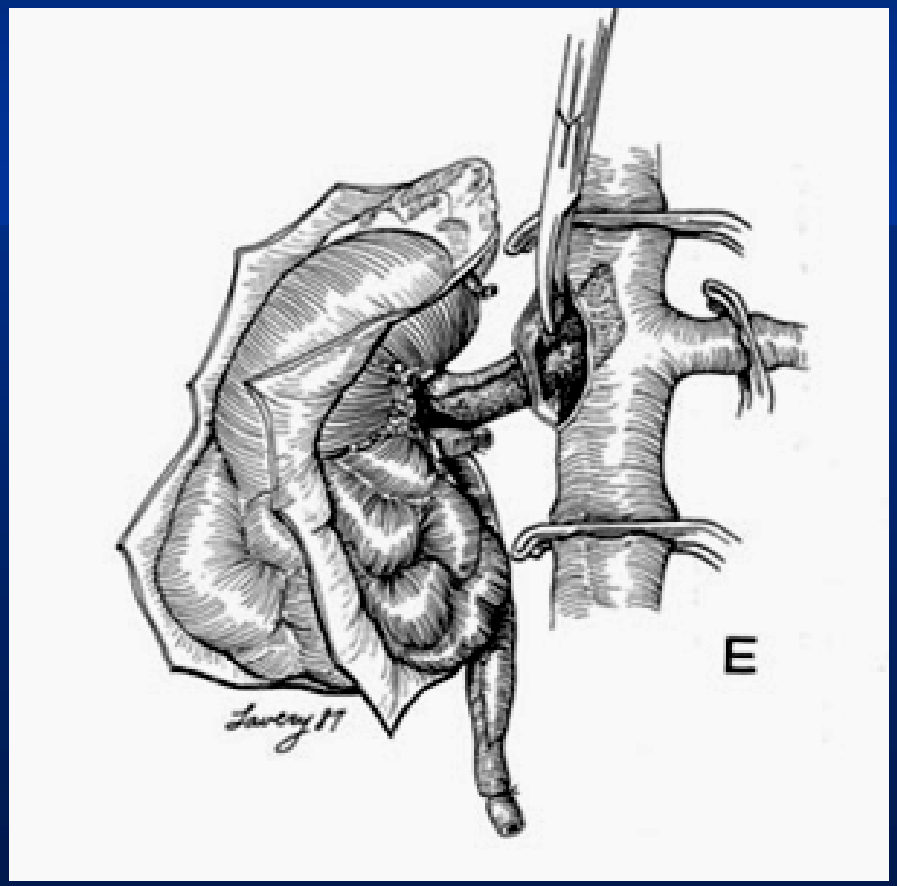
The renal artery and the ureter are ligated and divided, leaving the kidney attached by only the renal vein

Radical Nephrectomy with renal vein and vena caval involvement



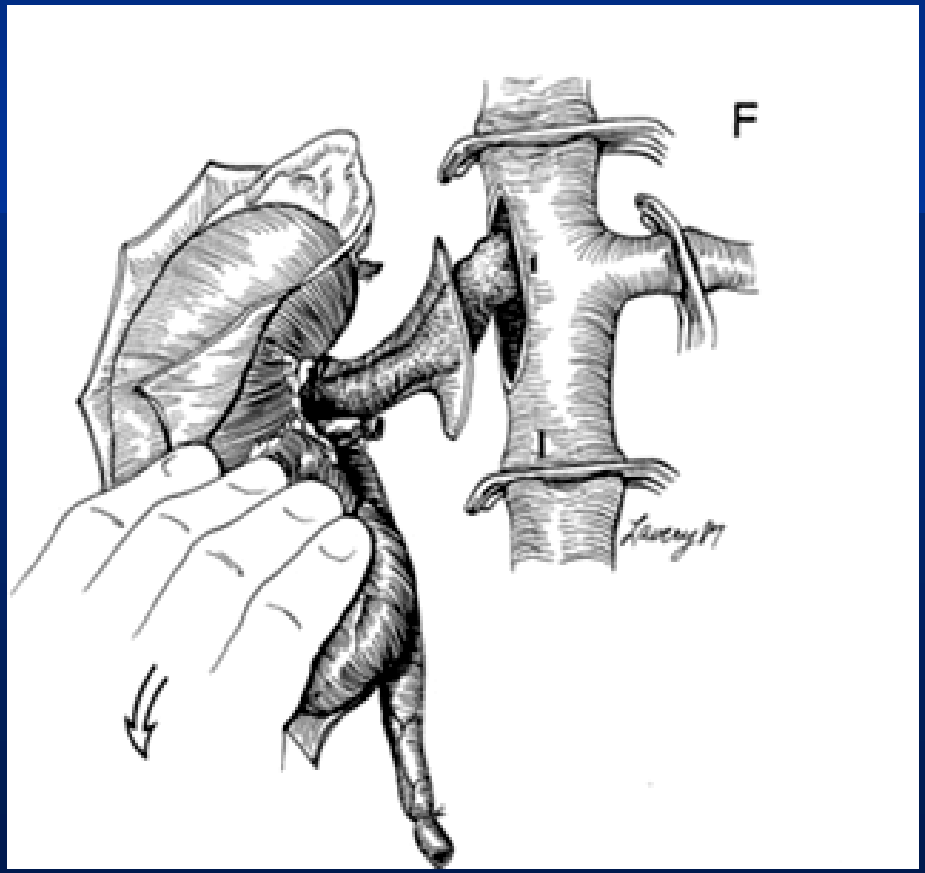
The infrarenal vena cava , the opposite renal vein and the suprarenal vena cava are clamped with vascular clamp

Radical Nephrectomy with renal vein and vena caval involvement



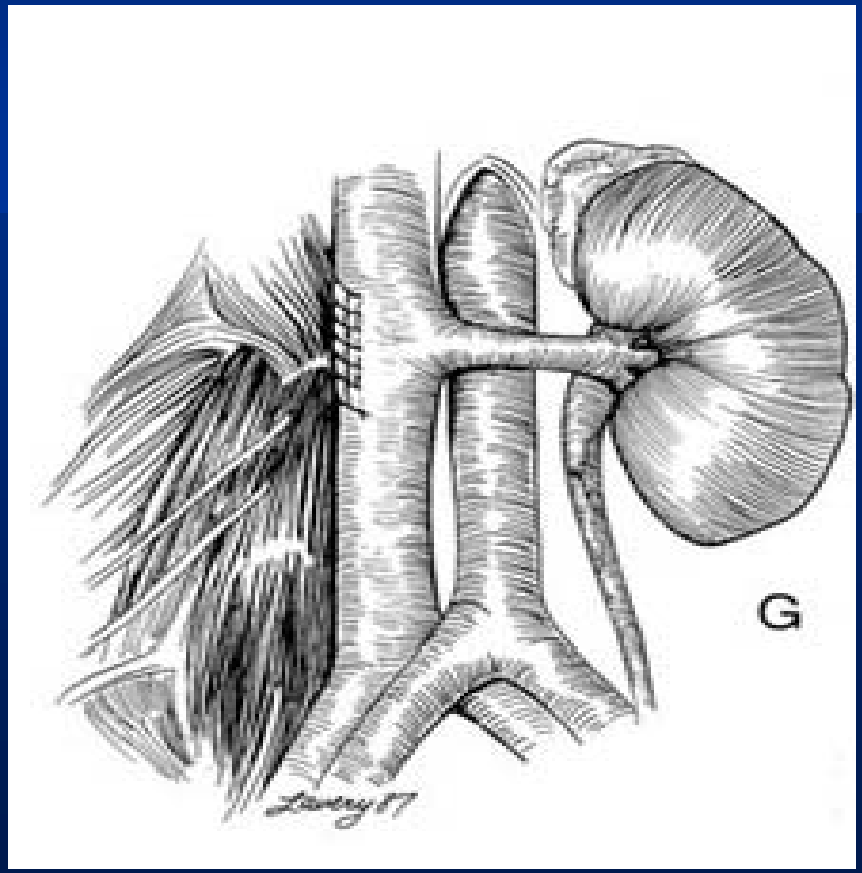
The anterior surface of the renal vein is then incised over the tumor thrombus, and the incision is continued posteriorly

Radical Nephrectomy with renal vein and vena caval involvement



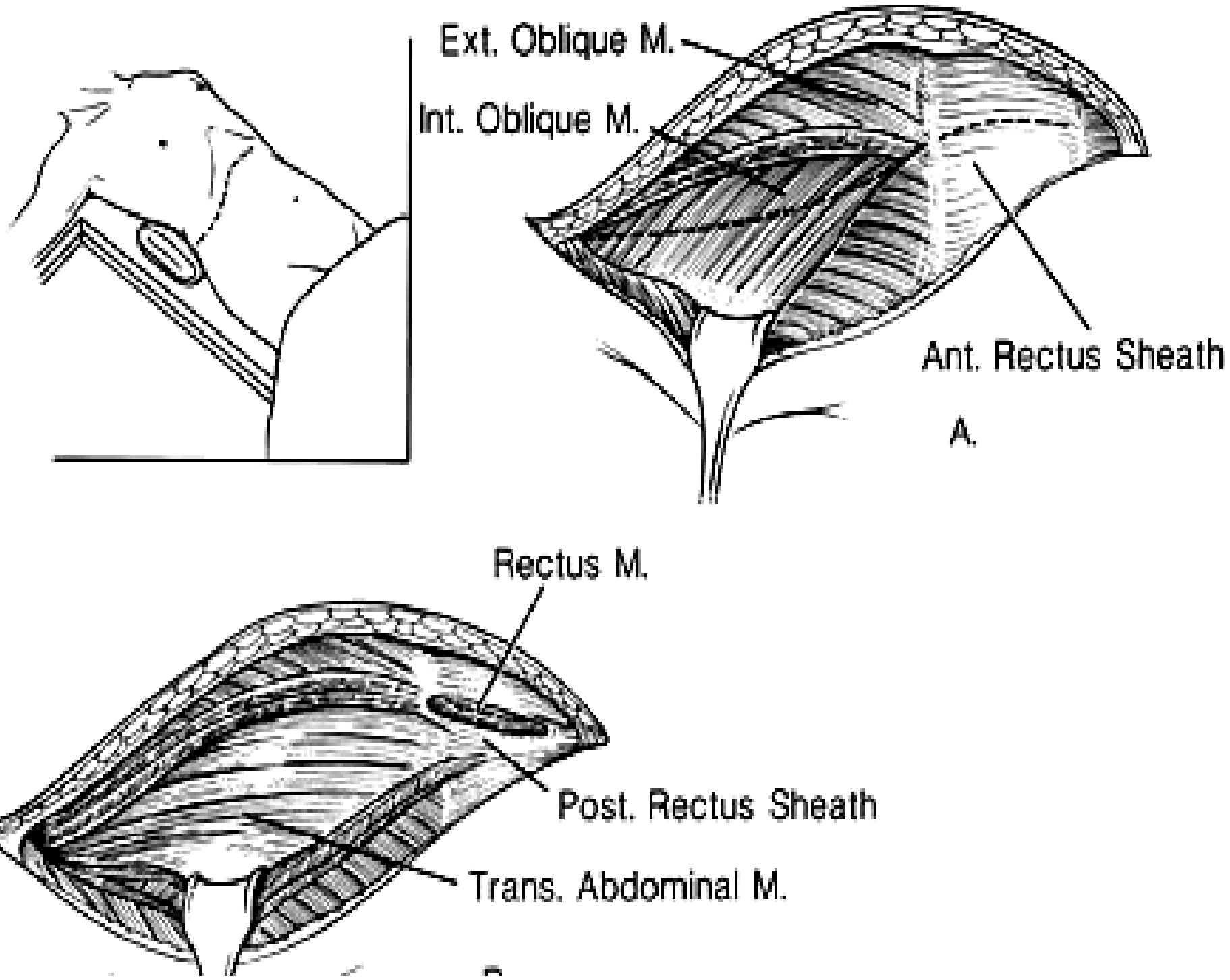
Gentle downward traction is exerted on the kidney to extract the tumor thrombus from the vena cava

Radical Nephrectomy with renal vein and vena caval involvement

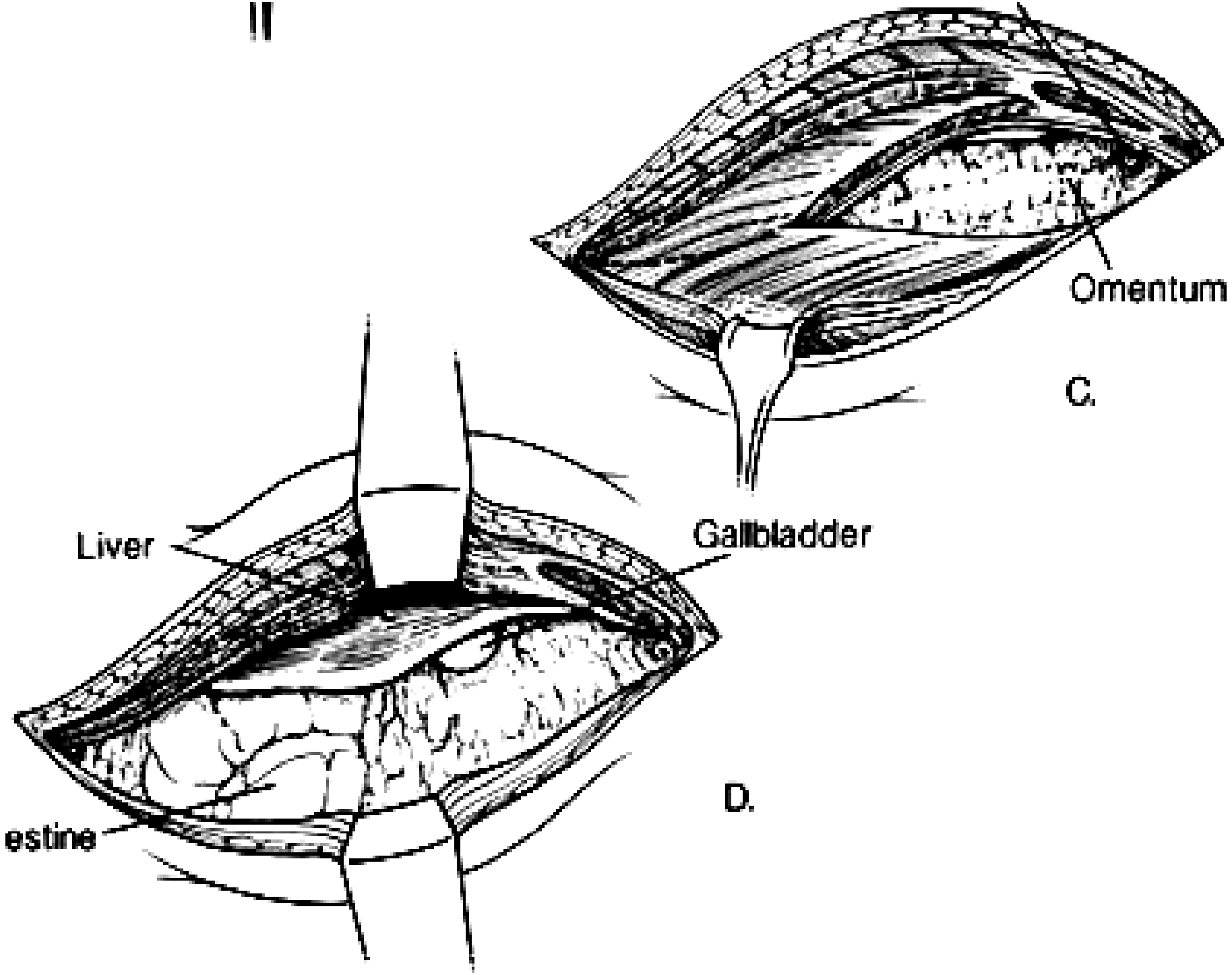


The cavotomy incision is repaired with a continuous

5–0 vascular suture


Ext. Oblique M.
Int. Oblique M.
Ant. Rectus Sheath
A.
Rectus M.
Post. Rectus Sheath
Trans. Abdominal M.

II

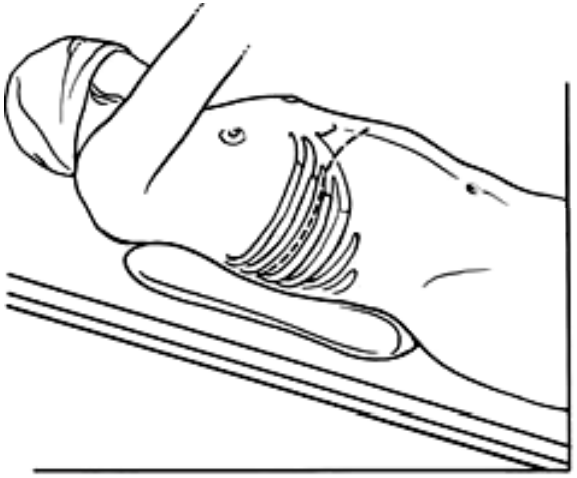


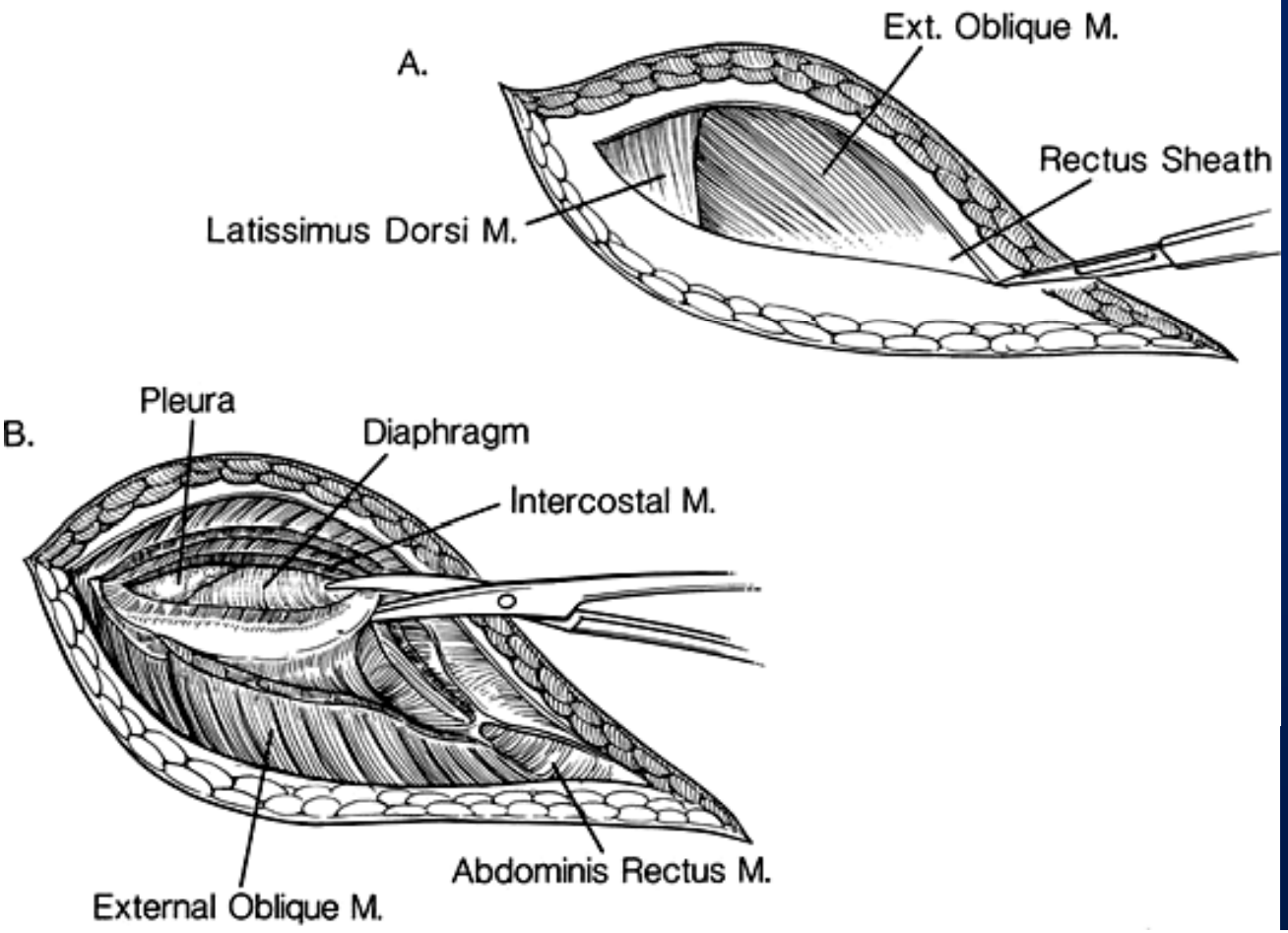
Thoracoabdominal Incision

Thoracoabdominal approach

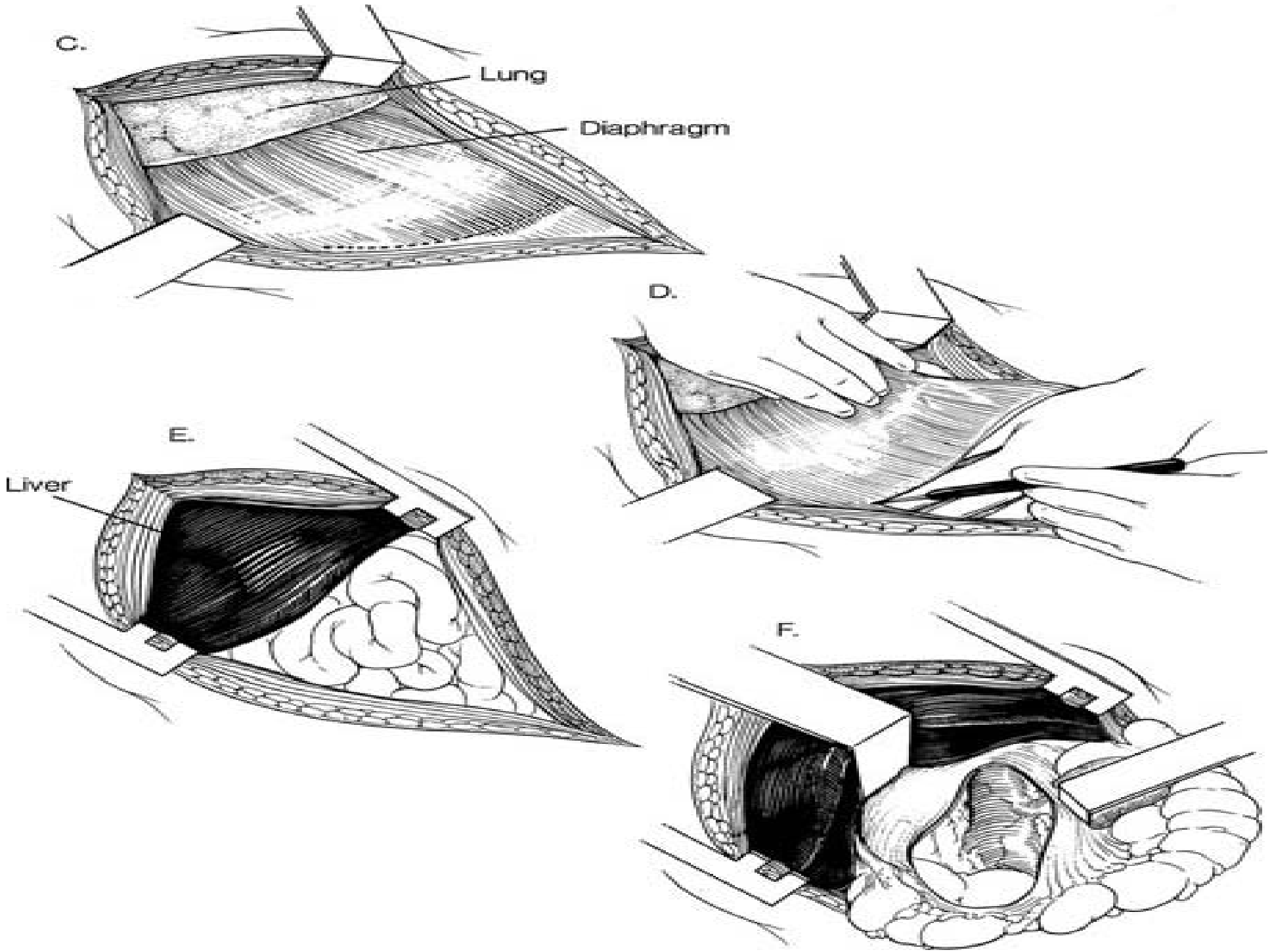
A) Patients with large tumors involving the upper portion of the kidney

B) Patients with caval thrombus extend above the level of portal vein





- Incision
- Rib
- Muscle
- Diaphragm


C.
Lung
Diaphragm
D.
E.
Liver
F.

Complications Of Radical Nephrectomy

- Postoperative complications occur in approximately 20% of patients
- operative mortality rate is approximately 2%

systemic complications may occur as after any surgical procedure:

- Myocardial infarction
- Cerebrovascular accident
- Congestive heart failure
- Pulmonary embolism
- Atelectasis, pneumonia
- Thrombophlebitis

Complications of radical nephrectomy

- Intraoperative retroperitoneal Hemorrhage
  - First site is Lumbar veins which enter the posterolateral aspect of the vena cava at each vertebral level, and undue traction on the cava can result in their avulsion with troublesome bleeding.

Complications Of Radical Nephrectomy…retroperitoneal Hge

- **A second** predictable bleeding site is the entry of the right gonadal vein into the anterolateral surface of the vena cava..
- **A third** predictable site of bleeding lies at the level of the left renal veins, where large lumbar veins often course posteriorly
- **A fourth** predictable site of bleeding is at the level of the right adrenal vein that enters the IVC.

Role Of Angioinfarction

- Indication
  - Huge renal mass
  - Life threatening hematuria
- Timing for surgery
  - 48 hours
  - Two weeks

Role Of Angioinfarction

- **Material**
  - Autologous blood vessels
  - Polyvinyl alcohol
  - Stainless steel coil
  - Sterile cellulose
  - Gel foam
- **Advantage**
  - Decrease hge during surgery
  - Decrease tumor size
  - Stimulate host immune system
  - Renal vein can be ligated early
  - Decrease hge and pain

Role Of Angioinfarction

- Comlication
  - Pain
  - Sepsis
  - Fever
  - Ileus
  - Dislocation of the coil

Local Recurrence After Radical Nephrectomy

- Residual disease is left within the renal fossa.
- Advanced stage T patients with positive lymph nodes appear to be at increased risk of renal fossa recurrence.

Local recurrence after radical nephrectomy is quite rare in patients with low-stage T1–T2 N0M0 RCC

surgical excision remains the preferred treatment whenever feasible .

TREATMENT OF METASTATIC RENAL CELL CARCINOMA

1) Nephrectomy

Approximately one third of patients with RCC exhibit metastatic disease at the time of initial presentation

- Removal of the primary tumor could induce regression of metastatic lesions.
- Palliative nephrectomy is occasionally indicated in patients with :
  - severe hemorrhage
  - severe pain
  - paraneoplastic syndromes
  - compression of adjacent viscera.

TREATMENT OF METASTATIC RENAL CELL CARCINOMA

2) Hormonal Therapy

progestins

overall response rate of less than 5%

TREATMENT OF METASTATIC RENAL CELL CARCINOMA

3) Chemotherapy

RCC is a chemo-resistant tumor

vinblastine appeared to be the most promising, the overall response rate was approximately 25%.

The combination of vinblastine and other chemotherapeutics gives no improvement but more side effect

TREATMENT OF METASTATIC RENAL CELL CARCINOMA

4) Radiation Therapy

RCC is radio-resistant tumor

Radiation therapy can be beneficial in the treatment of symptomatic osseous metastases

TREATMENT OF METASTATIC RENAL CELL CARCINOMA

5) Immuno-biologic Therapy

patients are more likely to exhibit a favorable clinical response to immunotherapy

- Good performance status.
- Nephrectomy for the primary lesion.
- Exhibit non-bulky pulmonary and/or soft-tissue metastases.
- Asymptomatic or have minimal symptoms.

TREATMENT OF METASTATIC RENAL CELL CARCINOMA

unfavorable response to immunotherapy

- Unresected primary tumors.
- Extensive prior systemic treatment.
- Bulky metastases to viscera or bone.

TREATMENT OF METASTATIC RENAL CELL CARCINOMA

Immunobiologic Therapy protocoles :

- Interferon-α
- IL-2
- Interferon-α and IL-2
- IL-2, interferon-α, and 5-FU
- lymphokine-activated killer (LAK)
- TILs
- More recent approaches to adoptive therapy involve the use of autologous vaccines to generate sensitized T cells in vivo

TREATMENT OF METASTATIC RENAL CELL CARCINOMA

6) Multimodality Therapy

initial adjuvant nephrectomy followed by immunotherapy

initial immunotherapy followed by Nephrectomy For responders

nephrectomy and immunotherapy followed by resection of residual or recurrent metastatic lesions

NEPHRON SPARING SURGERY IN LOCALIZED RENAL TUMORS

Indications of nephrons sparing surgery (NSS)

- **Imperative**
  - Solitary kidney
  - Bilateral synchronous or asynchronous tumors
  - Von Hippel Landau disease (high risk of recurrence)
  - Patients with multi focal tumors
- **Elective indications**
  - Small solitary tumors (<4 cm) evaluated T1 N0 by imaging
  - Easily respectable and with a normal contra lateral kidney

THE AIMS OF NSS

complete removal of the tumor with negative margin

Minimal loss of normal kidney tissue

PREPLANING OF RENAL SURGERY

- **General:**

  general pre-operative blood examination as blood picture ,serum electrolytes , serum calcium , renal functions, and liver functions

Evaluation

- Renal arteriography

To delineate the intrarenal vasculature aids in excising the tumor with minimal blood loss and damage to adjacent normal parenchyma.

Evaluation

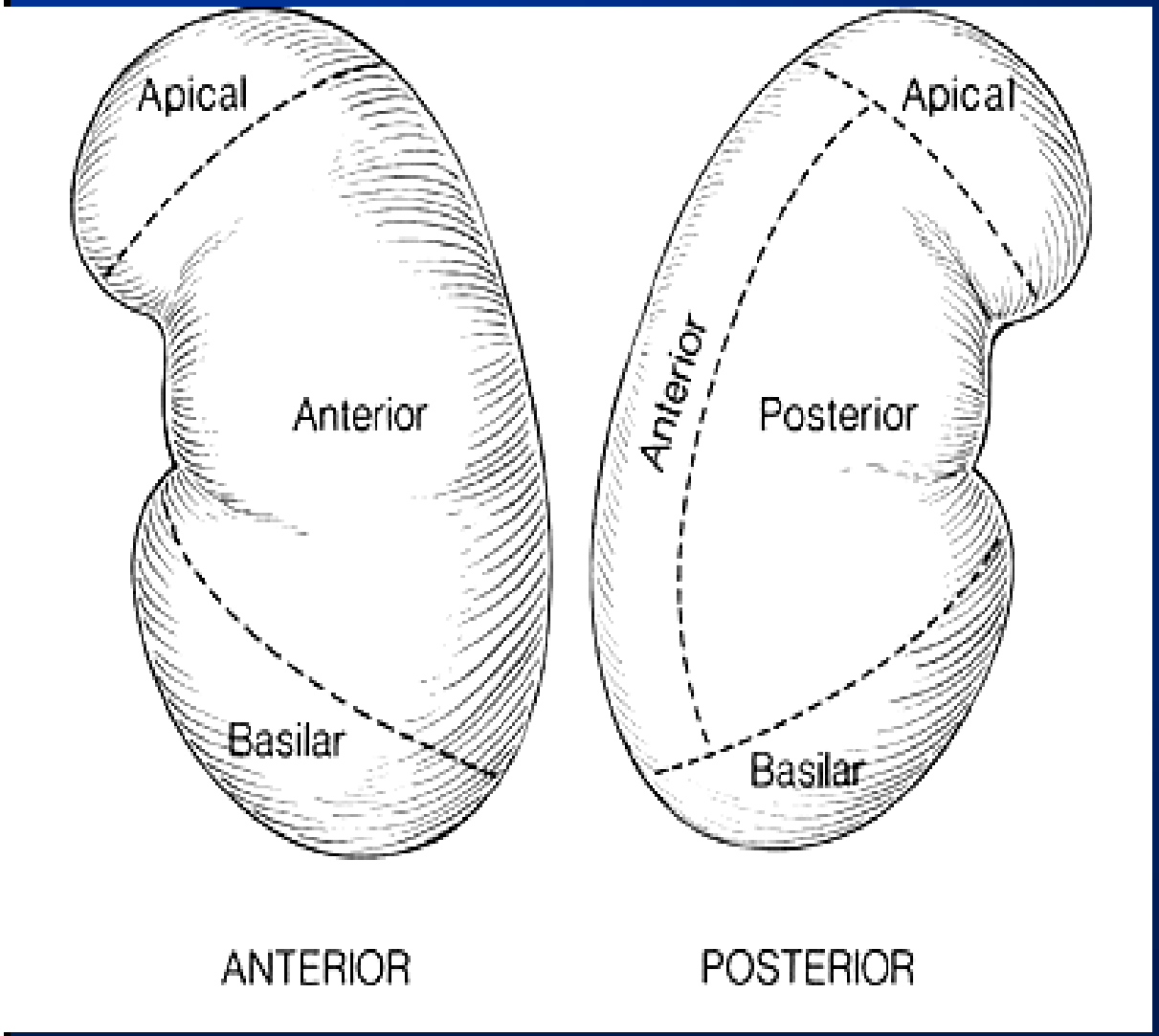
- Three-dimensional CT

Is a noninvasive imaging modality that can accurately depict the renal parenchymal and vascular anatomy in a format familiar to urologic surgeons.

Evaluation

- Selective renal venography

Is performed in patients with large or centrally located tumors to evaluate for intrarenal venous thrombosis secondary to malignancy



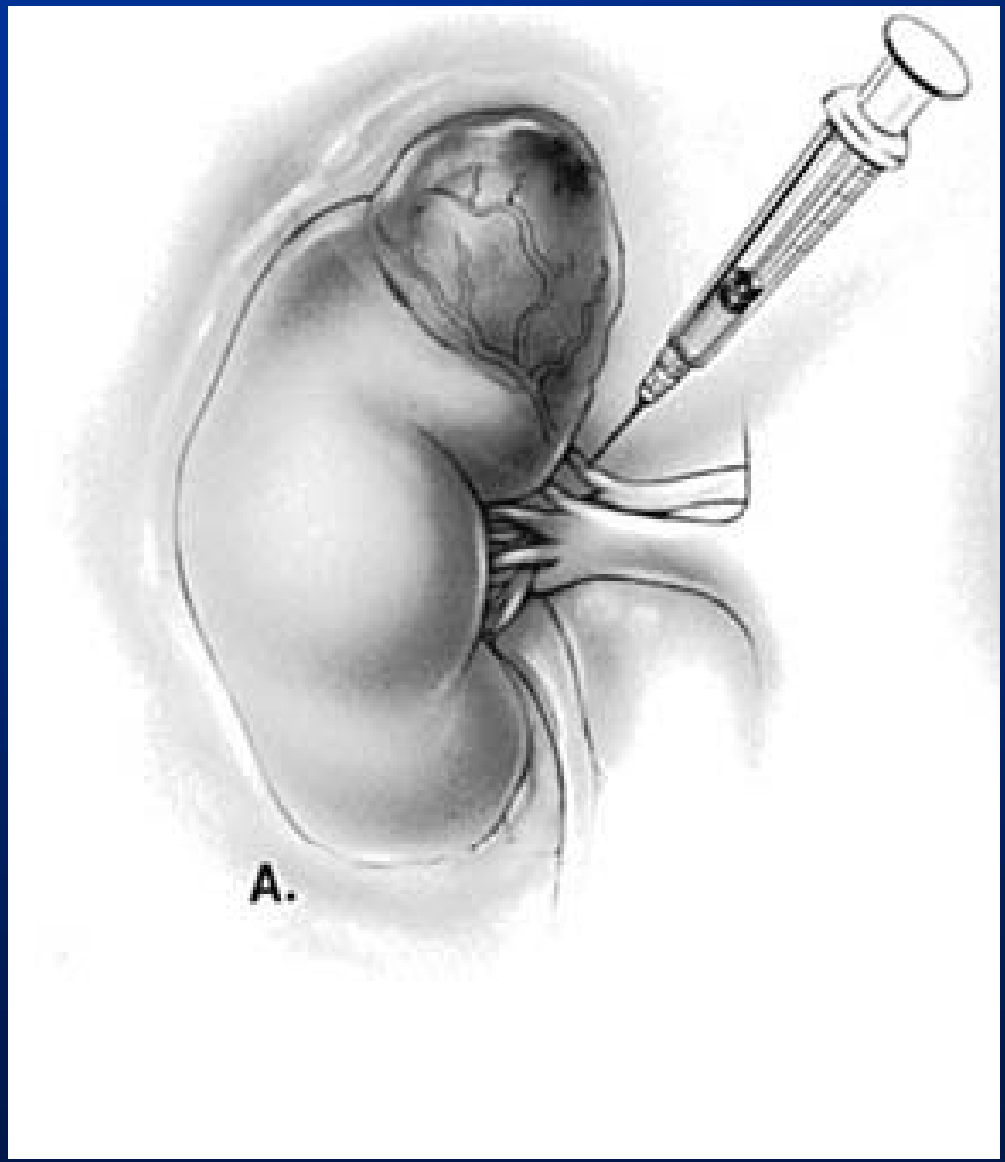
Segmental blood supply of the kidney

Surgical techniques for NSS

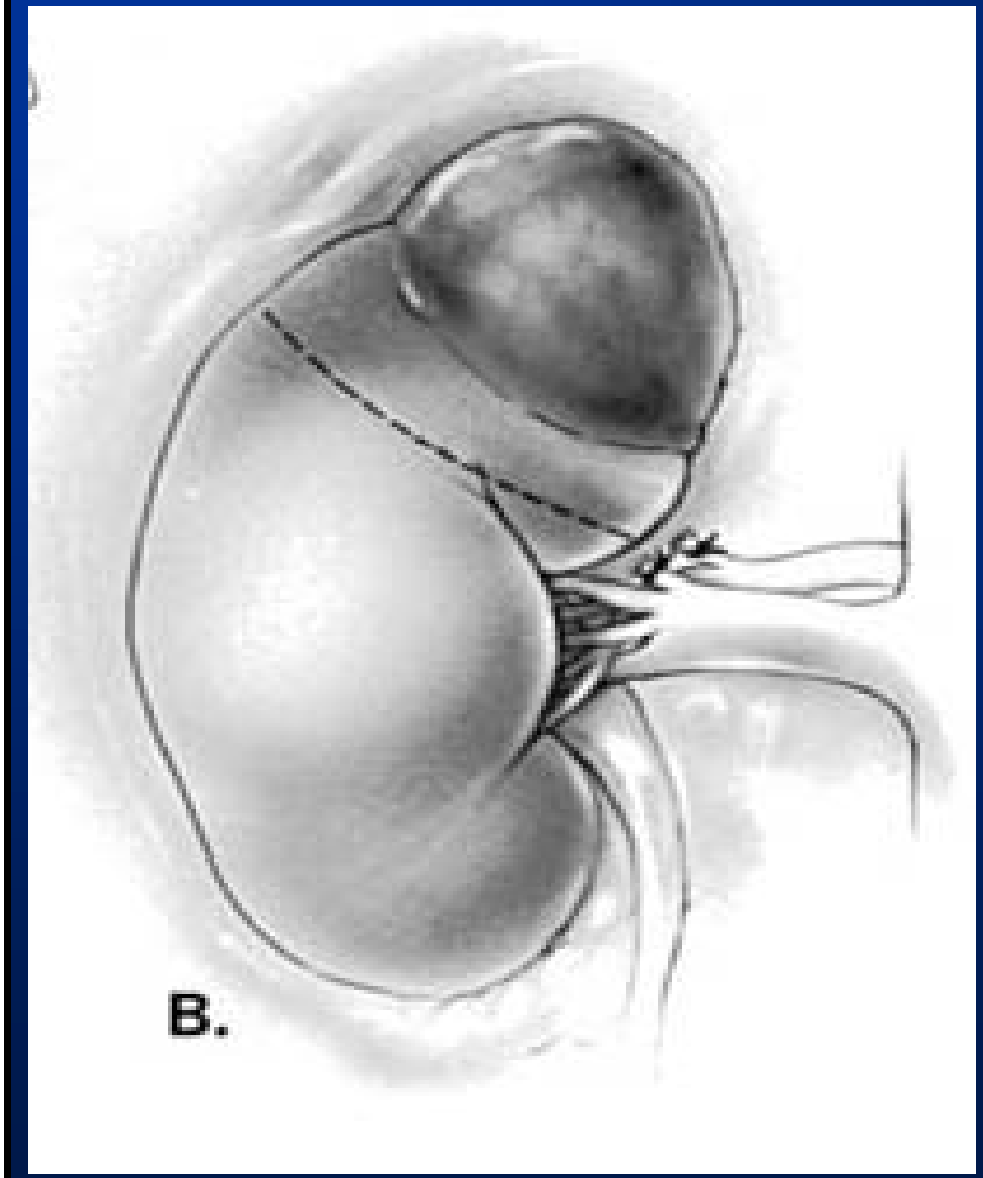
- Polar segment nephrectomy
- Wedge resection
- Transverse resection
- Simple enucleation,
- Extracorporeal partial nephrectomy with renal autotransplantation.

Segmental Polar Nephrectomy

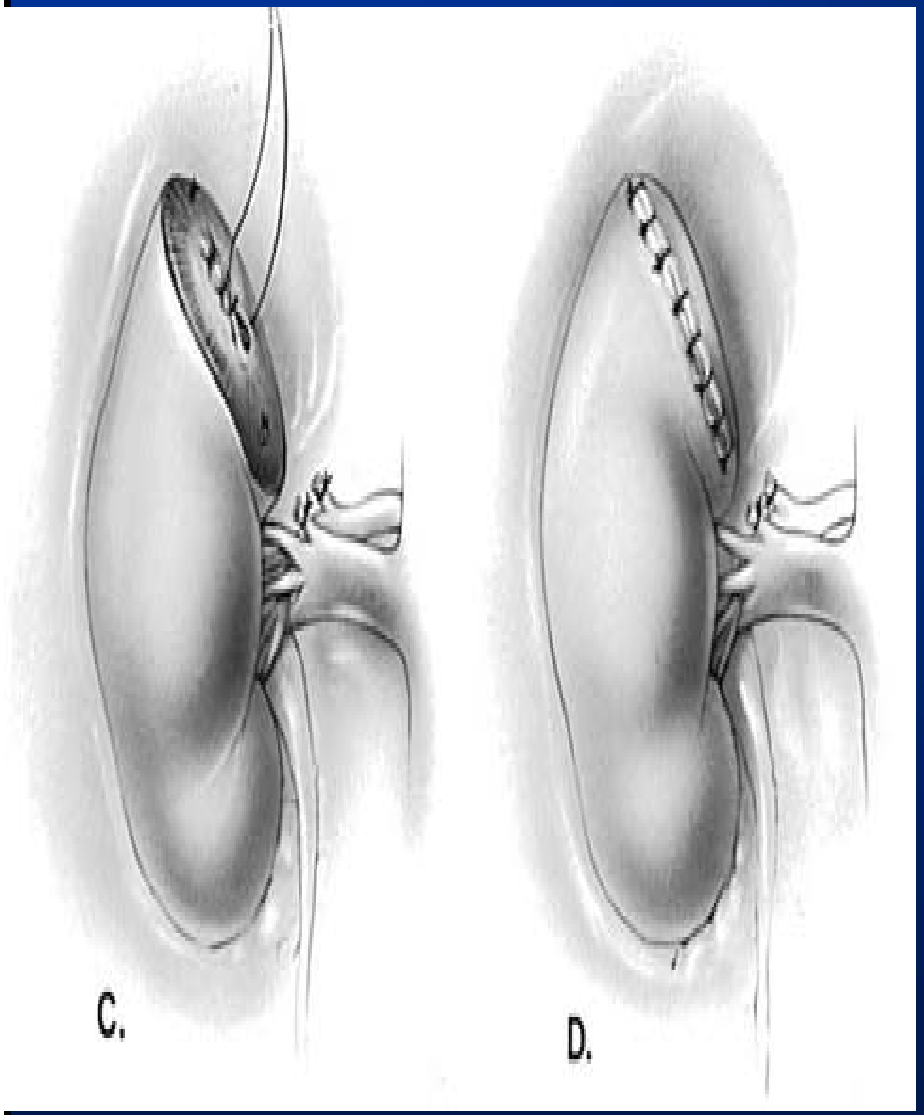
- In patients with malignancy confined to the upper or lower pole of the kidney
- Partial nephrectomy can be performed by isolating and ligating the segmental apical arterial branch



The apical artery is dissected away from the adjacent structures, ligated, and divided.



Ischemic line of demarcation then generally appears on the surface of the kidney

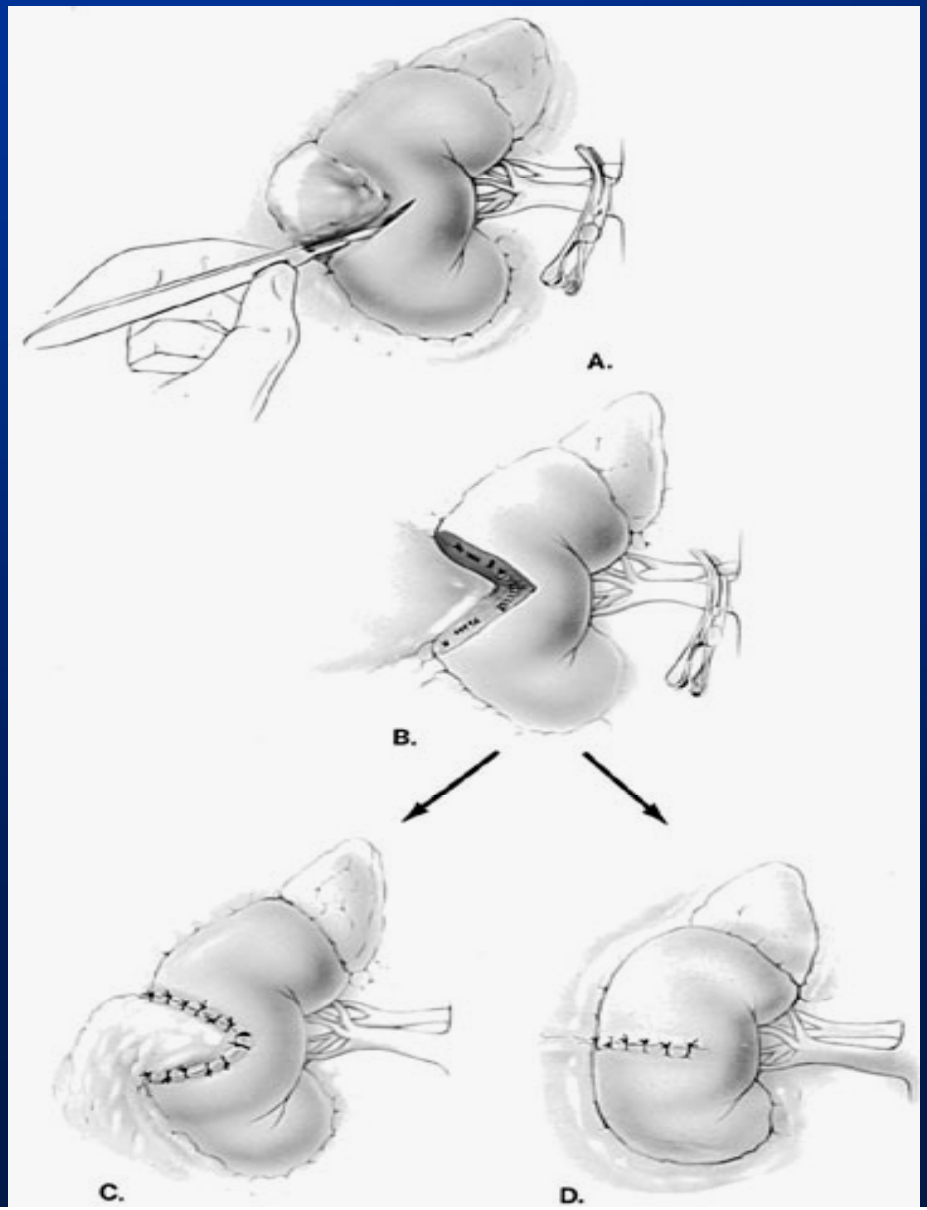


- An incision is then made in the renal cortex at the line of demarcation
- The parenchyma is divided by sharp and blunt dissection
- The edges of the kidney are reapproximated

Wedge Resection

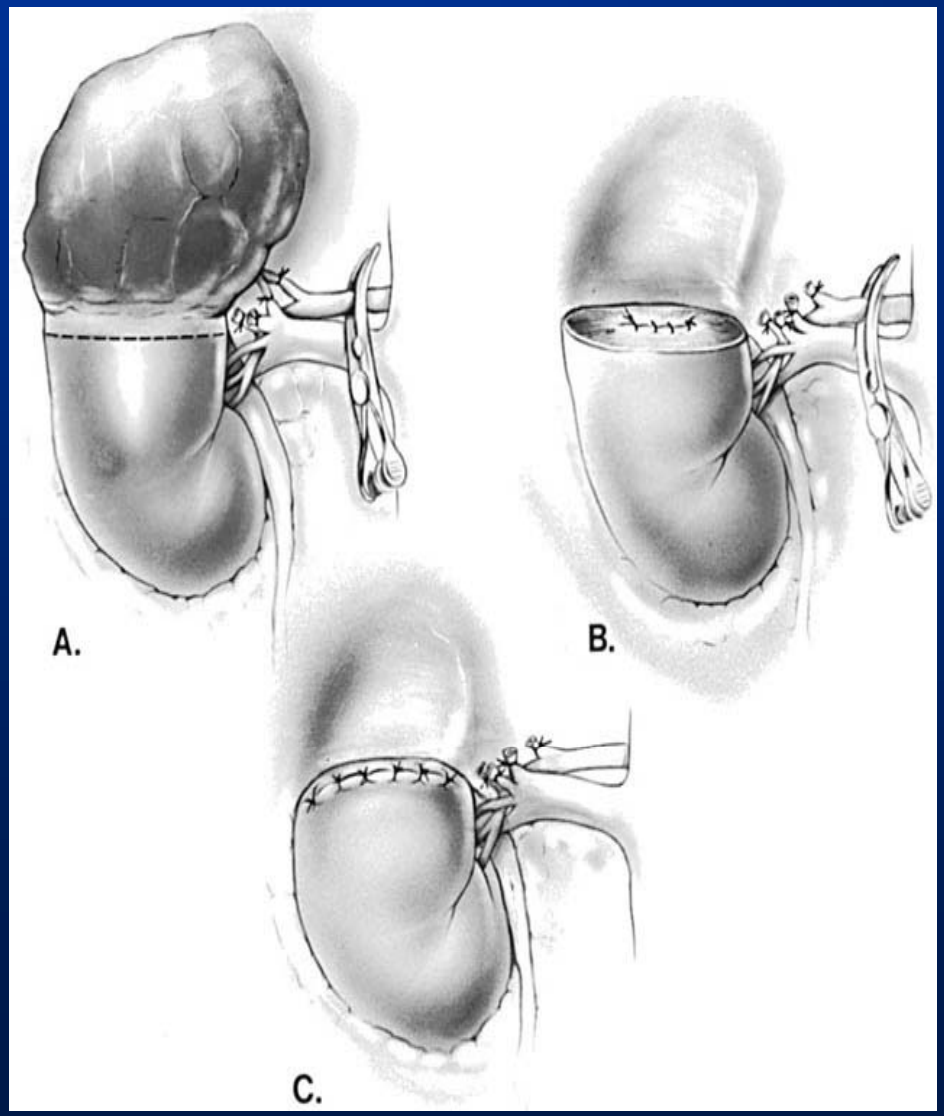
- Wedge resection is an appropriate technique for removing peripheral tumors on the surface of the kidney
- The tumor is removed with a several-millimeter surrounding margin of grossly normal renal parenchyma

Wedge Resection



- The kidney may be closed on itself
- A portion of perirenal fat may simply be inserted into the base of the renal defect

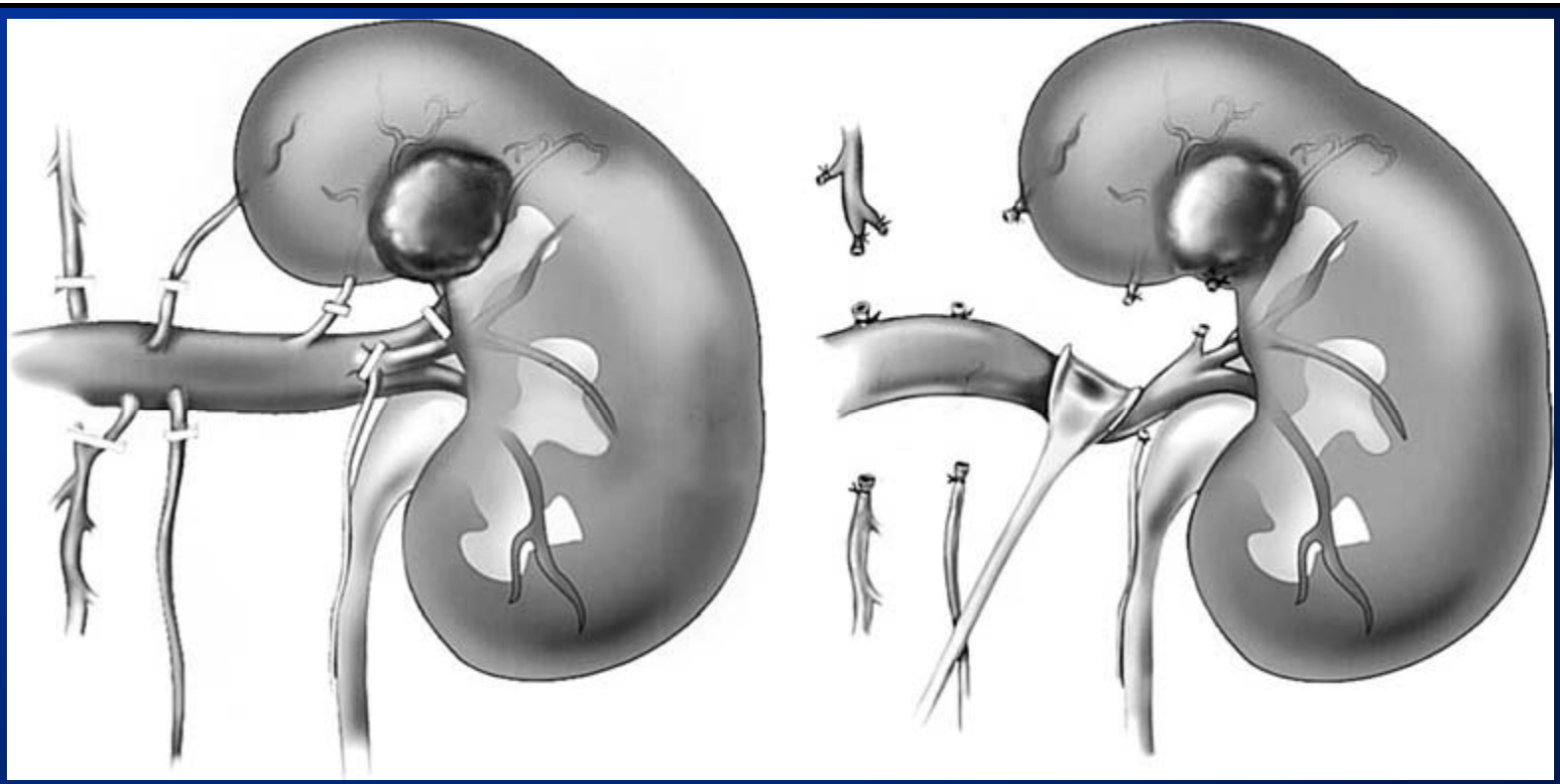
Major Transverse Resection



- For extensively involve the upper or lower portion of the kidney.
- surface hypothermia
- Transected blood vessels on the renal surface are secured

Partial Nephrectomy for Central Tumors

- For patients with central tumors
- Complete delineation of the renal arterial and venous supply is mandatory for surgical planning.
- The kidney is mobilized within gerota's fascia while leaving intact the perirenal fat around the tumor



•After temporary occlusion of the renal artery and vein, the mobilized and isolated tumor is resected by incision of the attachment to the renal parenchyma.

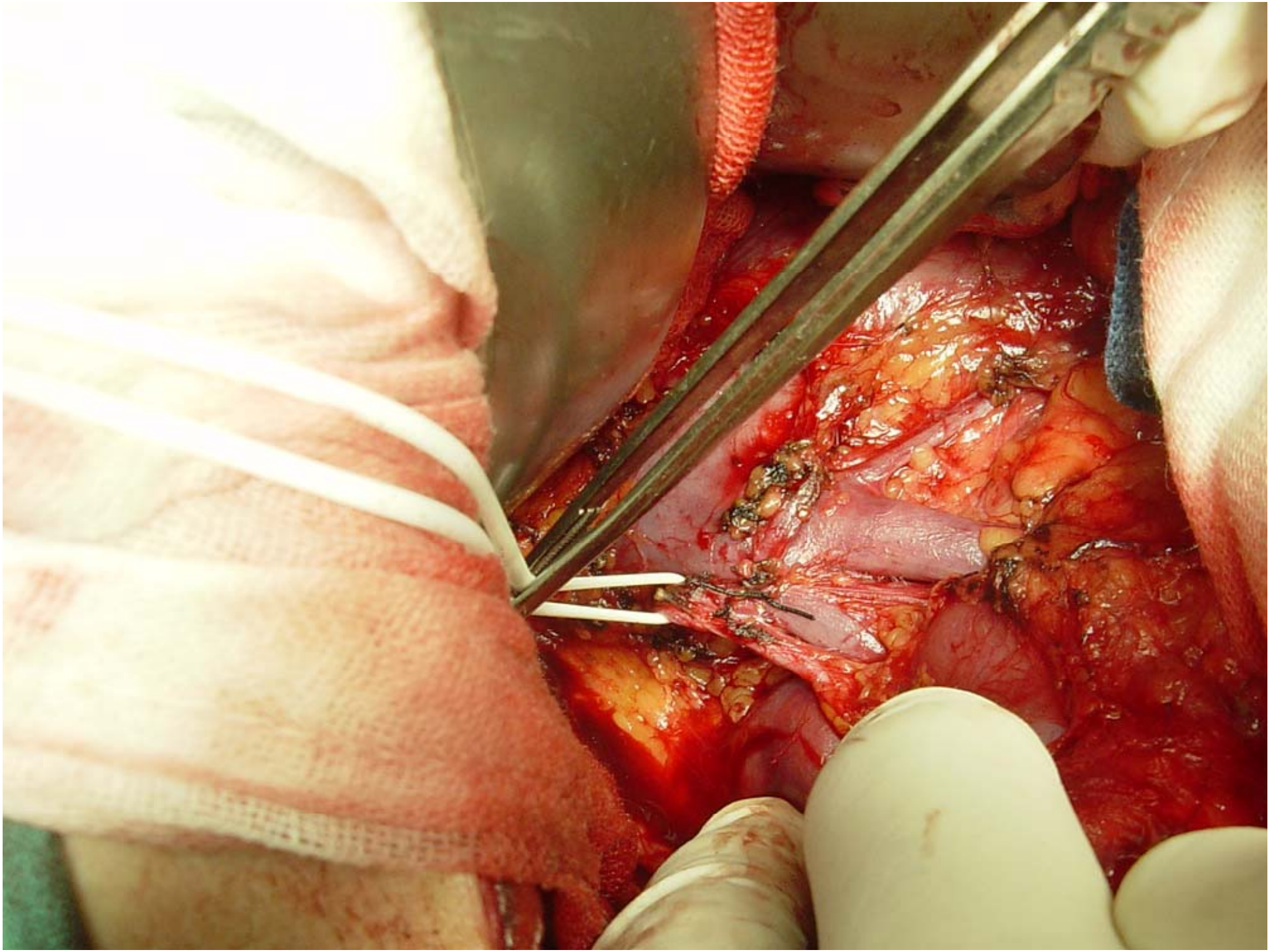
•After securing the renal vessels and the collecting system, the kidney is closed on itself by approximating the transected cortical margins

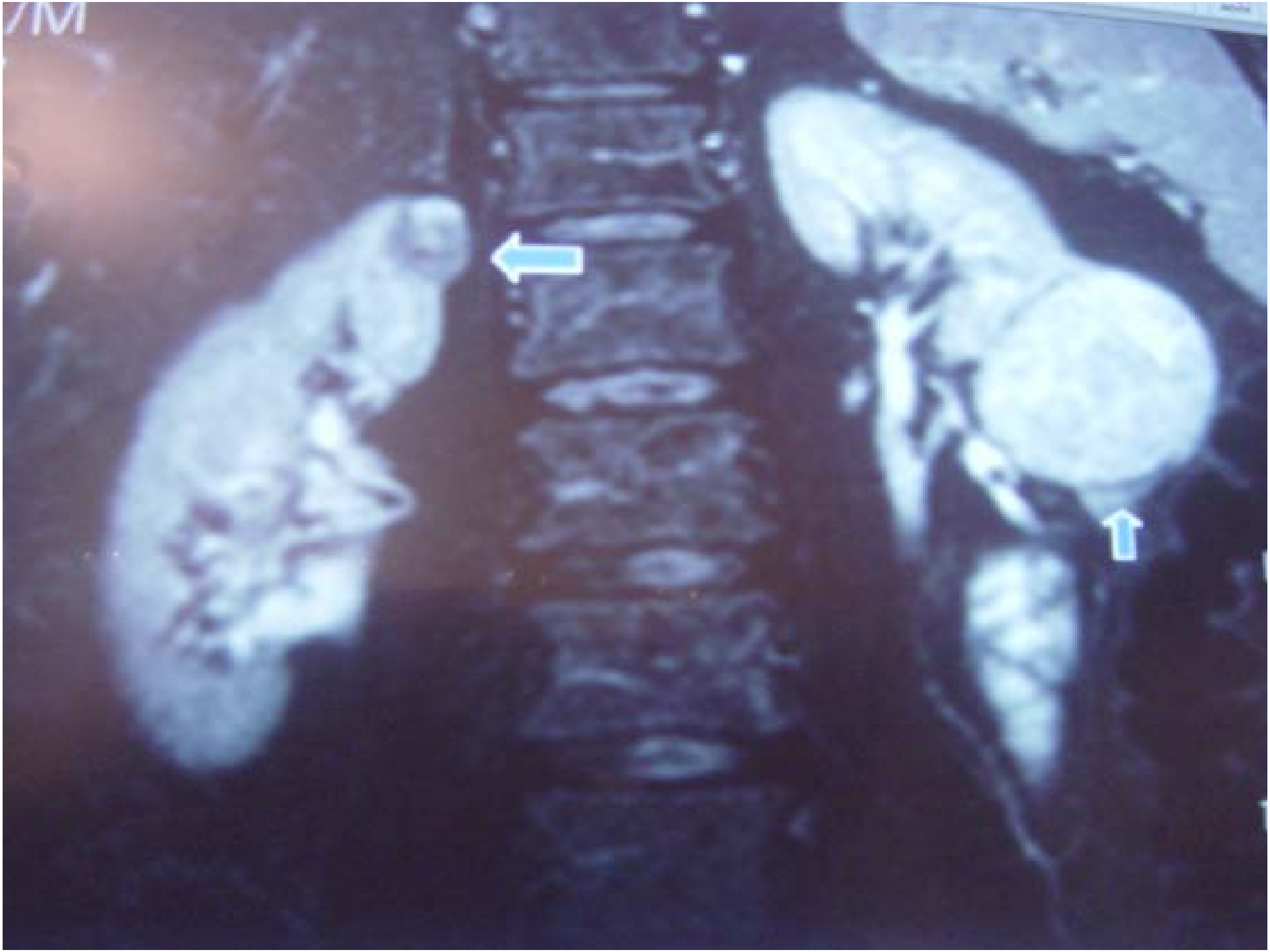
Simple Enucleation

- RCCs are surrounded by a distinct pseudocapsule of fibrous tissue .
- simple enucleation implies circumferential incision of the renal parenchyma around the tumors
- The technique of enucleation is currently employed only in:
  - Occasional patients with von hippel–lindau disease
  - Multiple low-stage encapsulated tumors involving both kidneys .

Simple Enucleation

- Invasion of the pseudo-capsule is common
- 27 – 37 % of tumor beds do contain tumor cells



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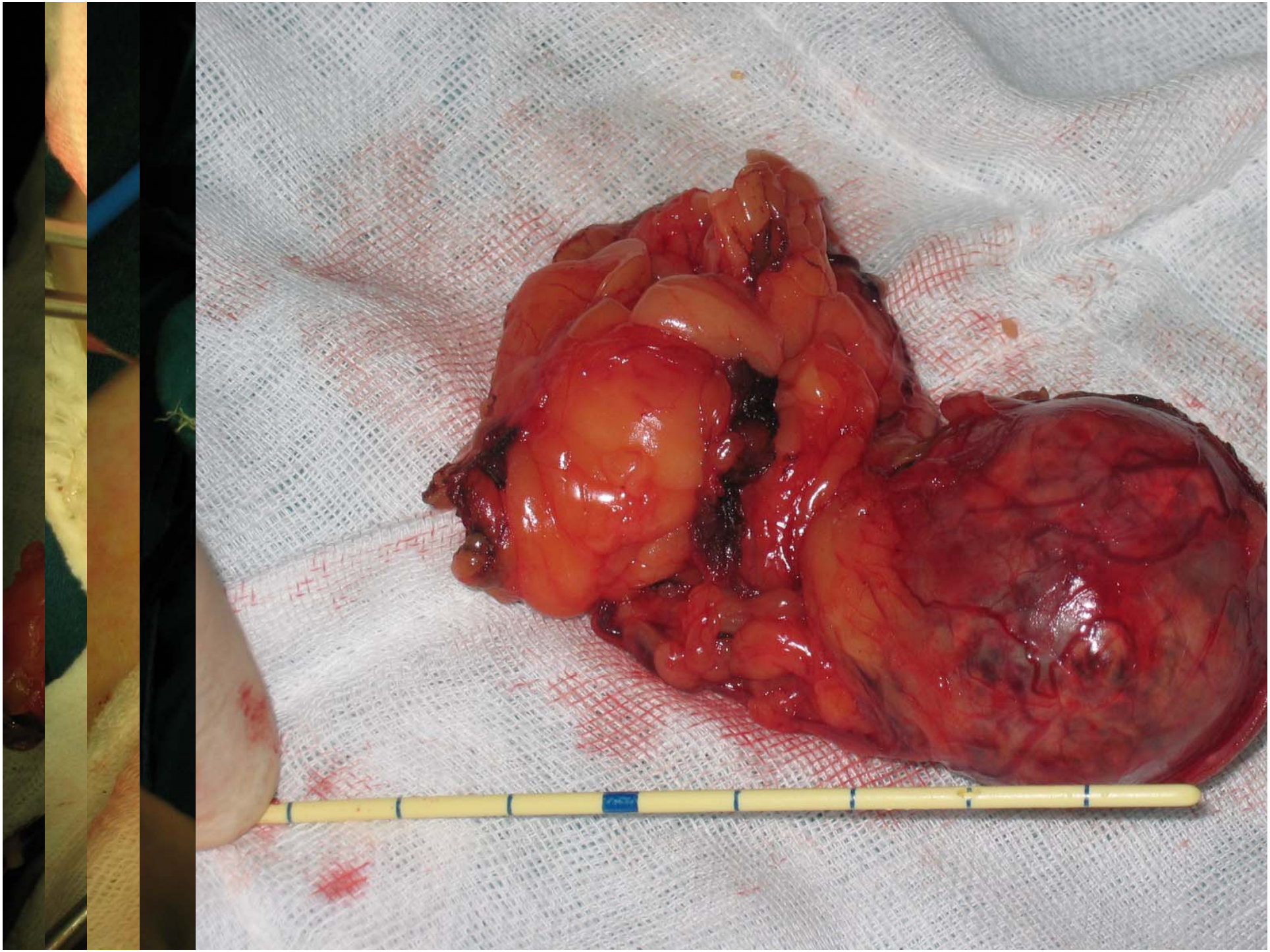


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Extracorporeal Partial Nephrectomy and Autotransplantation

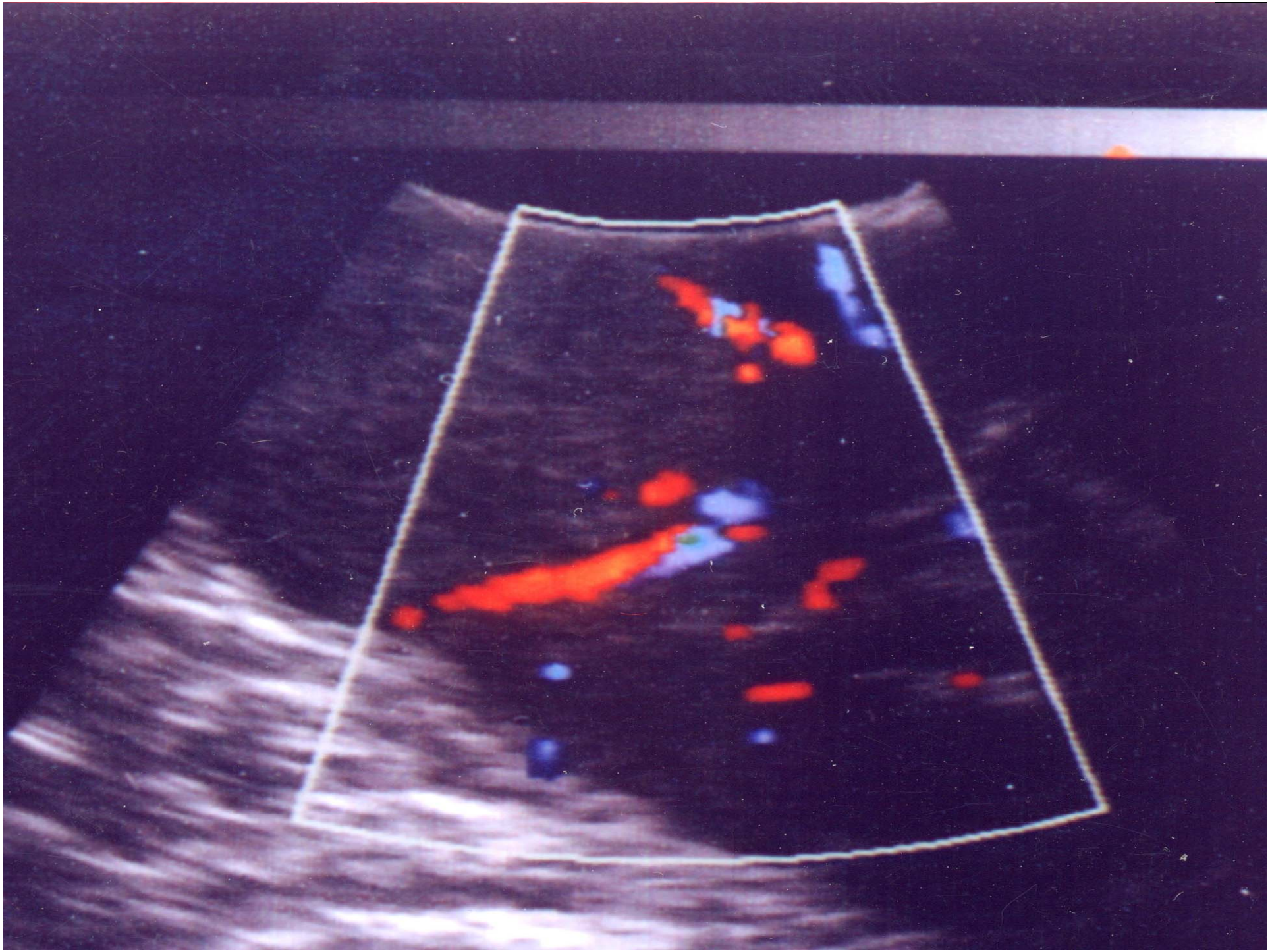
- The removed kidney is flushed with 500 ml of an intracellular electrolyte solution and is submerged in a basin of ice slush saline solution to maintain hypothermia..
- Autotransplantation into the iliac fossa is done

Complications of NSS

- Hemorrhage
- Urinary fistula
- Uretral obstruction
- Renal insufficiency
- Infection.

Intraoperative ultrasound

- Useful to localize intraparenchymal renal tumors
- Detection of multi-focal disease
- Small tumors
- The best used probe 7.5 MHz



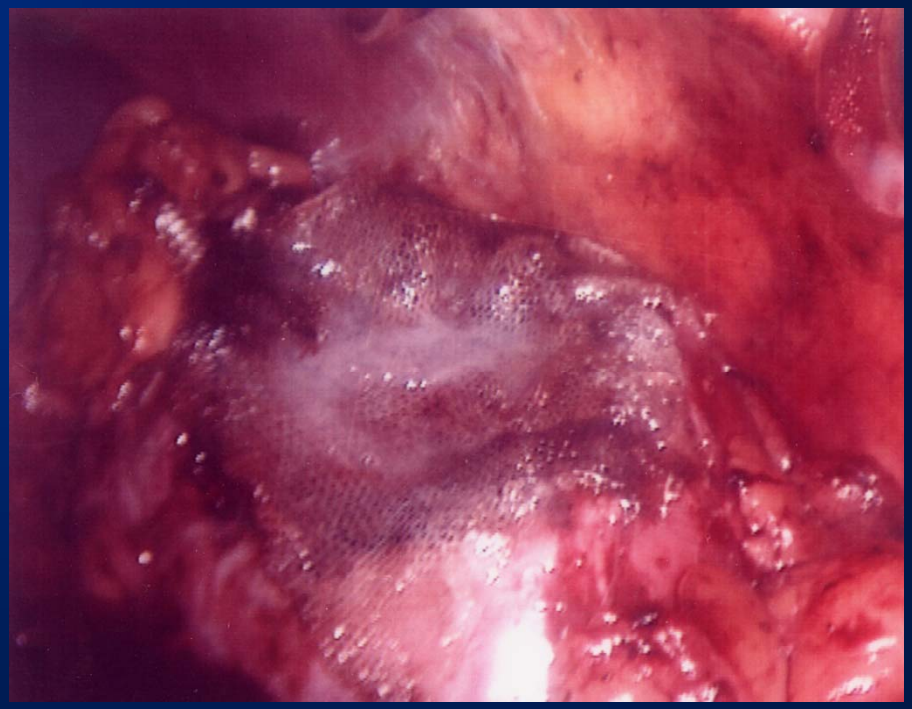
Developed tools to control bleeding

- Harmonic scalpel
- Argon coagulator
- Biological glues
- Water jet dissector
- Radiofrequency probes
- Lasers

DEVELOPED TOOLS

HAEMOSTATIC GLUE :

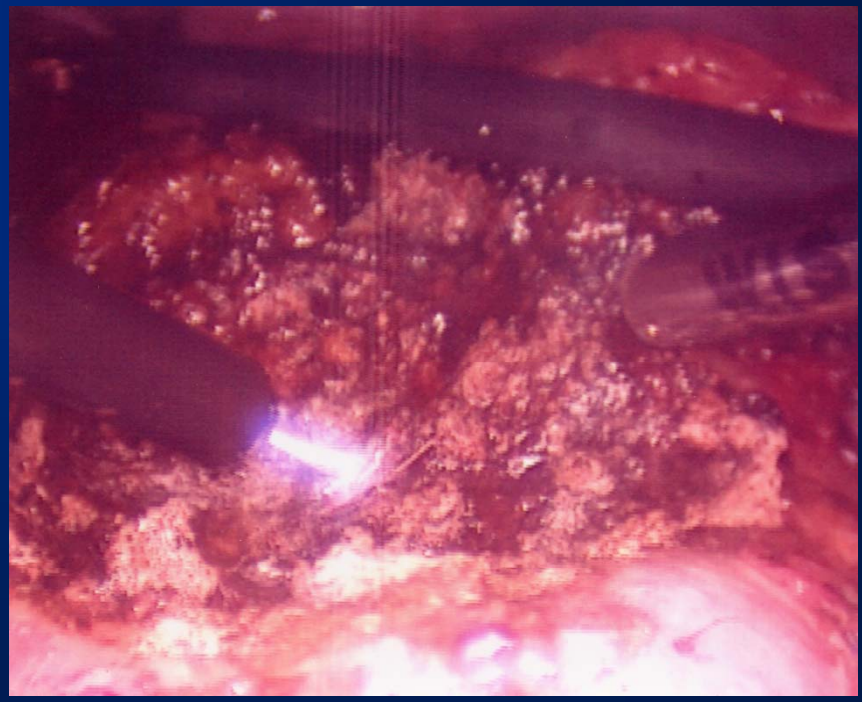
- Use is limited to a complement of good bleeding control
- Associated with clamping of the artery



DEVELOPED TOOLS

ARGON COAGULATOR:

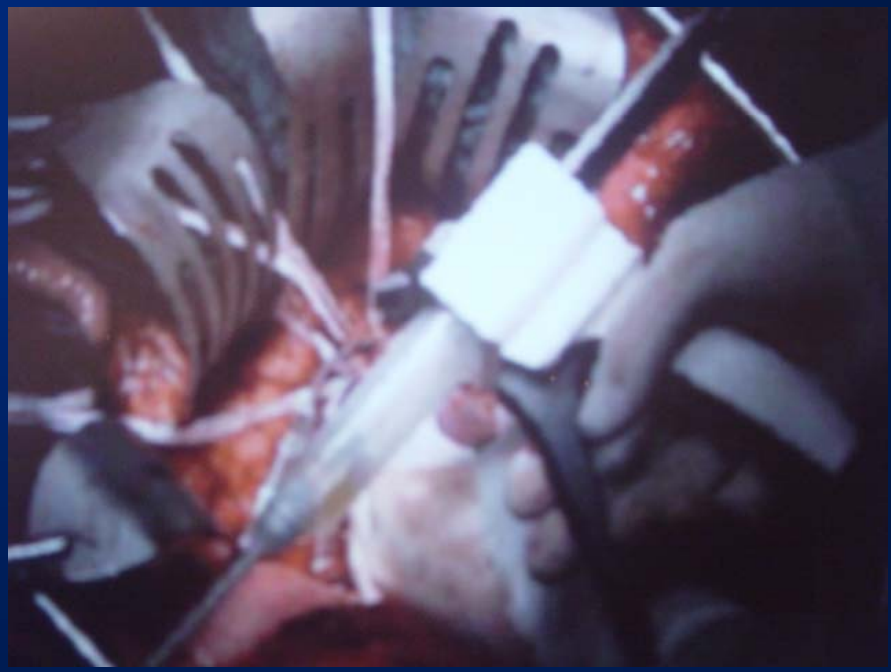
- Very efficient for coagulation of cortical renal parenchyma , but not at the medullar zone
- Not efficient on big vessels
- The device is not expensive reusable



DEVELOPED TOOLS

BIOLOGICAL GLUE:

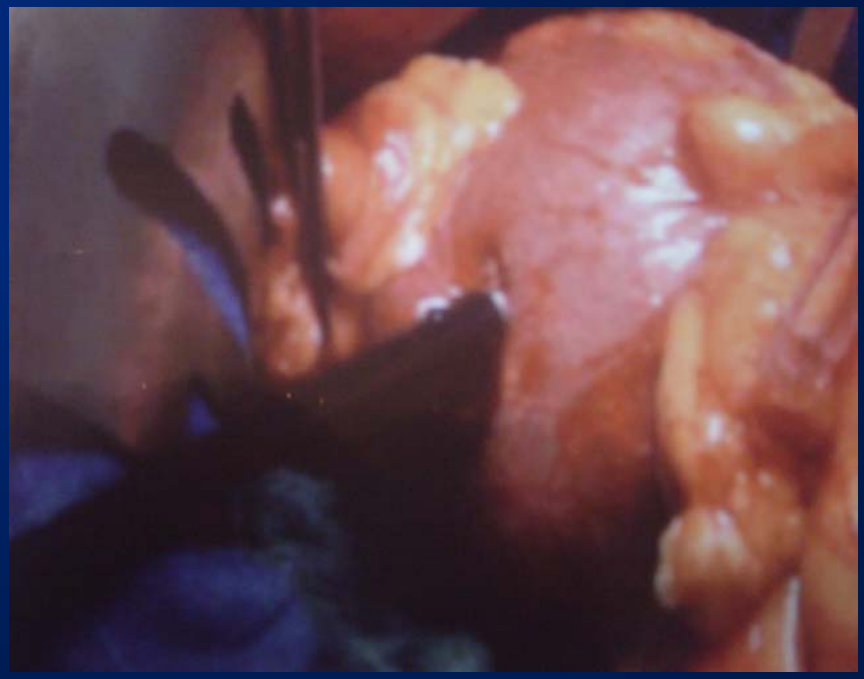
- Mixture of bovine and glutaraldehyde
- It has adhesive strength
- Very efficient for the kidney surface
- Less efficient for big vessels
- Reusable device + pre-filled cartridge



DEVELOPED TOOLS

WATER JET:

- Maximum pressure 50 bars
- Distilled water
- Complete dissection of the parenchyma with intact vessels
- Ligation of vessels
- Limited experience



Minimally invasive approches for NS

- Laparoscopic or partial nephrectomy
- Renal cryotherapy
- Radiofrequency
- High intensity focused ultrasound

MINIMALLY INVASIVE CRYOTHERAPY

- **INDICATIONS:**
  - Small (<3 cm)
  - Solitary
  - Away from the collecting system
- **CONTRAINDICATIONS:**
  - Coagulopathy
  - Completely intra-renal centrally
  - Post surgical adhesions

MINIMALLY INVASIVE CRYOTHERAPY

- Freezing by cryoprobe within the target
- Liquid nitrogen
- Creation of an ice ball around the probe
- Temperature needed – 20 degree C*
- Percutaneously or laparoscopically
- Ultrasonography is necessary

MINIMALLAY INVASIVE NSS

- **RADIOFREQUENCY:**
  - Ultrasound or MRI is necessary for imaging control
  - It can be used inside the tumor or to delineate the section zone in the parenchyma
  - Allows bloodless cutting of the kidney

MINIMALLY INVASIVE NSS

- **HIGH INTENSITY FOCUSED ULTRASOUND (HIFU)**
  - Tissues are heated to 100 degree Celsius
  - Clear delineation between heated and normal tissue
  - It may be used laparoscopically, percutaneously or in open surgery

MINIMALLY INVASIVE NSS MISCELLANEOUS TECHNIQUES

- Intracavitary photon irradiation
- Microwave thermotherapy
  - No significant clinical data have been reported to date

Laparoscopy In Malignant Renal Tumors

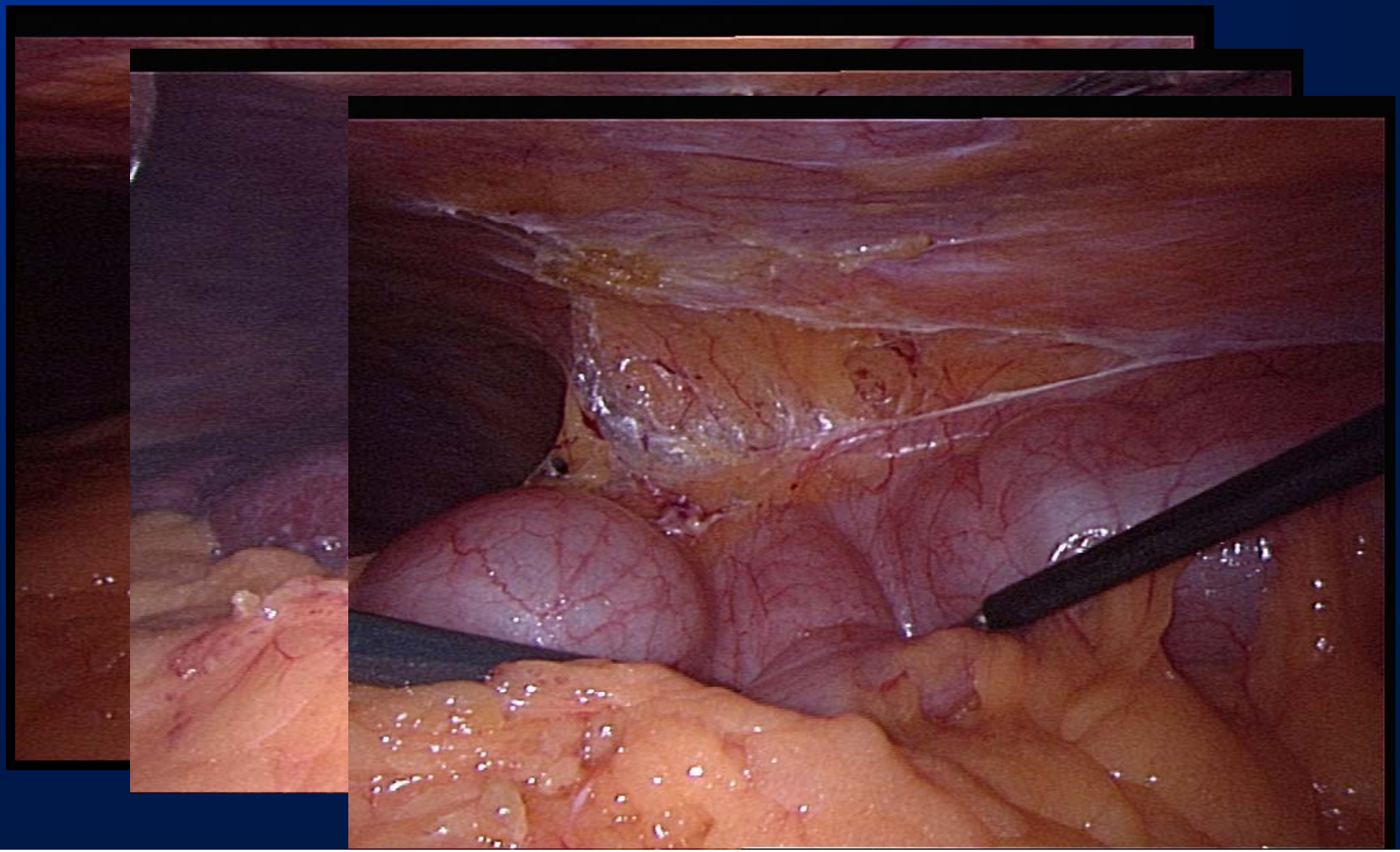
- The laparoscopic approach to renal cell carcinoma has evolved into a safe and effective minimally invasive alternative to open surgery.

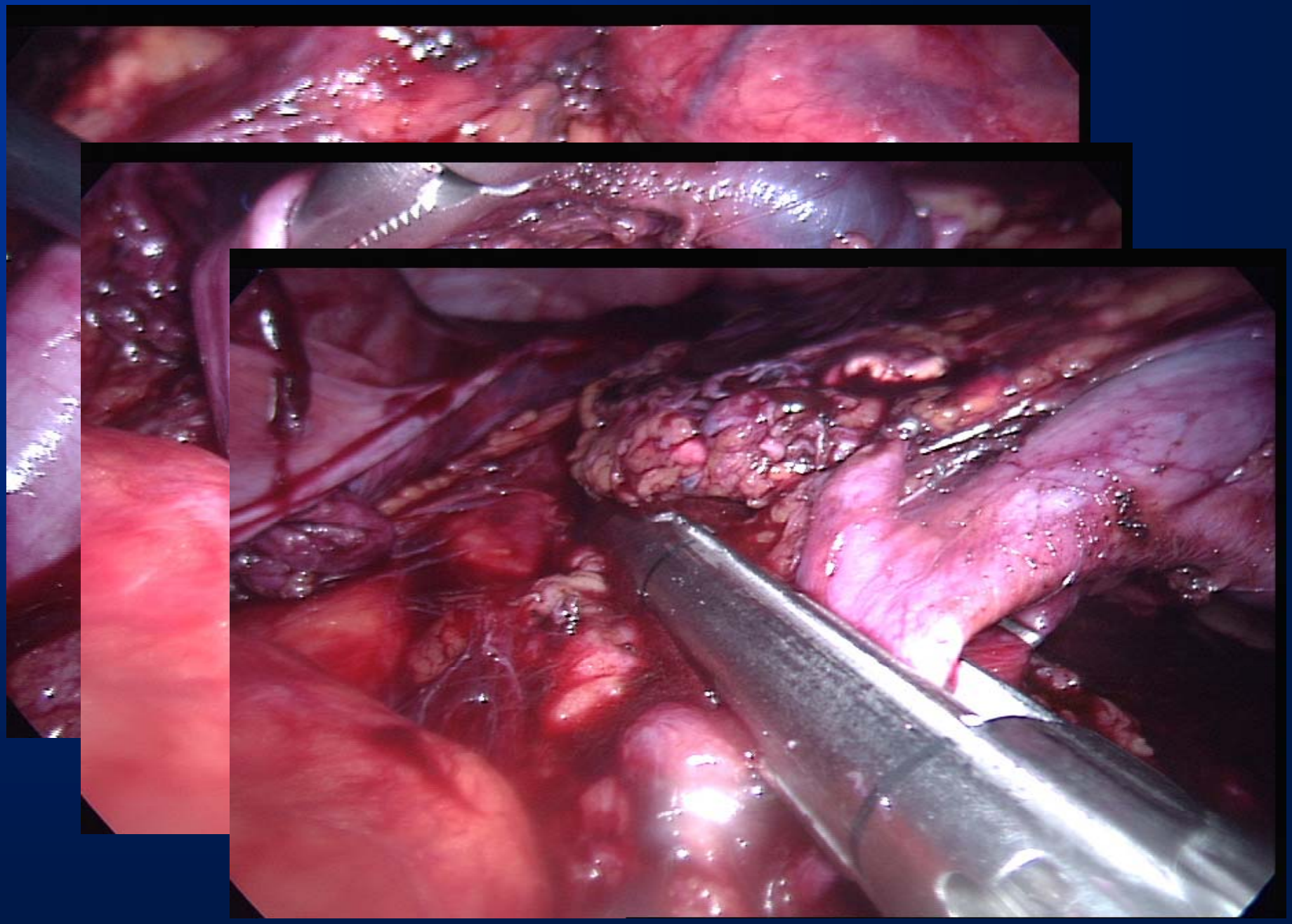
- The perioperative benefits of the procedure are well Laparoscopic radical nephrectomy has been applied to patients with advanced stages of renal cell carcinoma. Contraindications to laparoscopic radical nephrectomy include tumors with renal vein or vena cava thrombi.

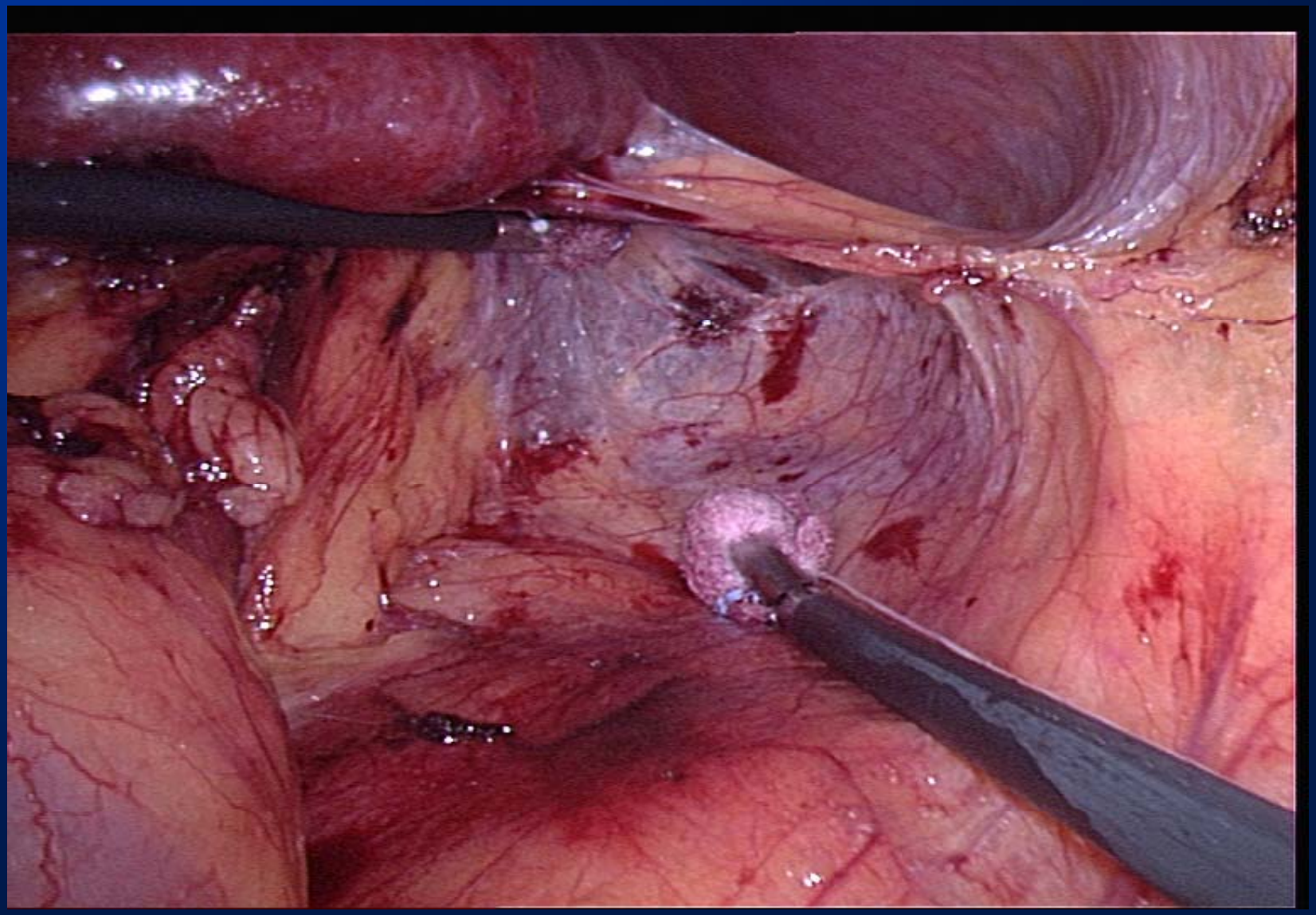
Laparoscopy in malignant renal tumors

- Approaches
  - Transperitoneal
  - Retroperitoneal
  - Hand assisted

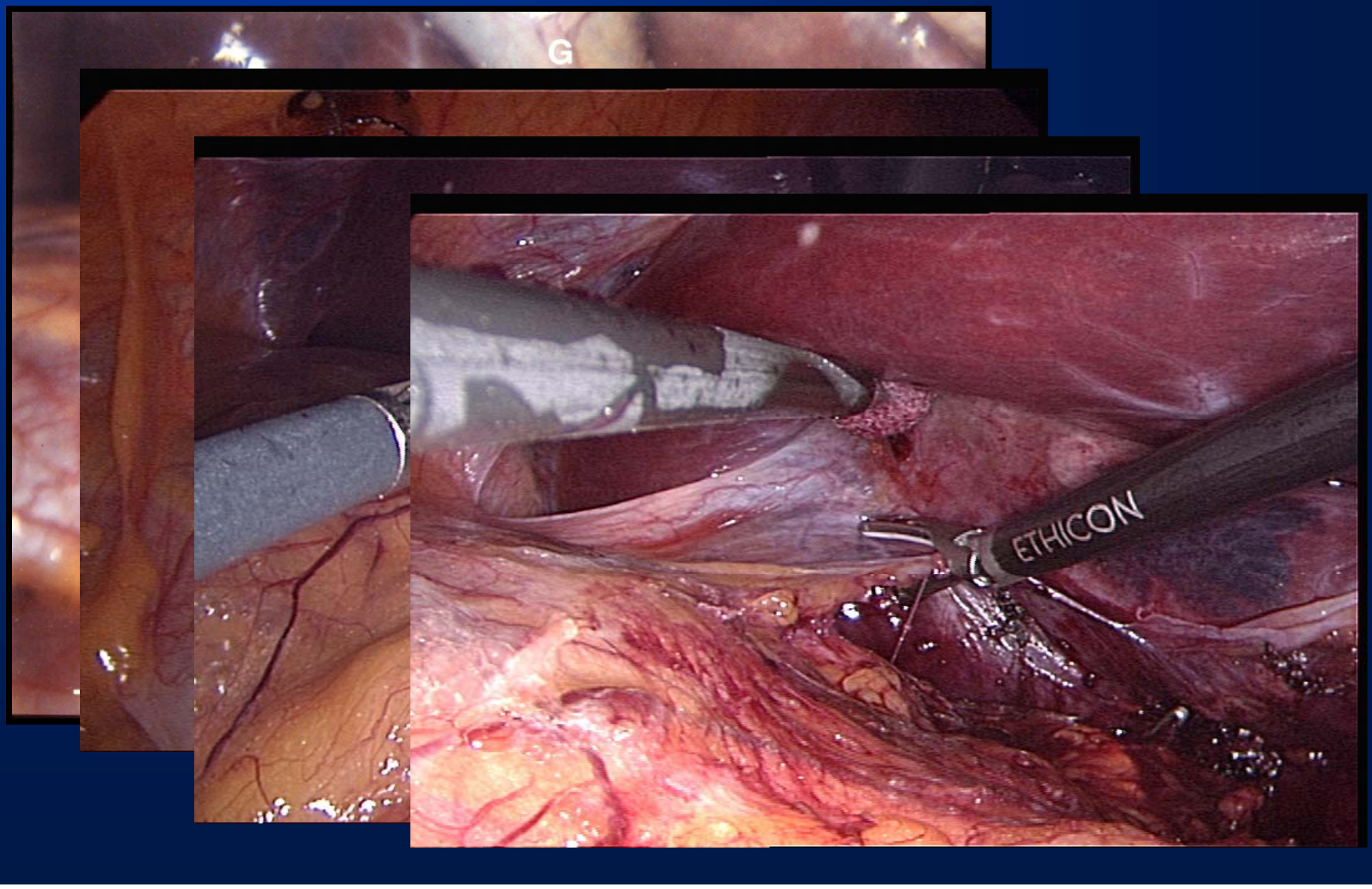
Transperitoneal Approach: Left Side

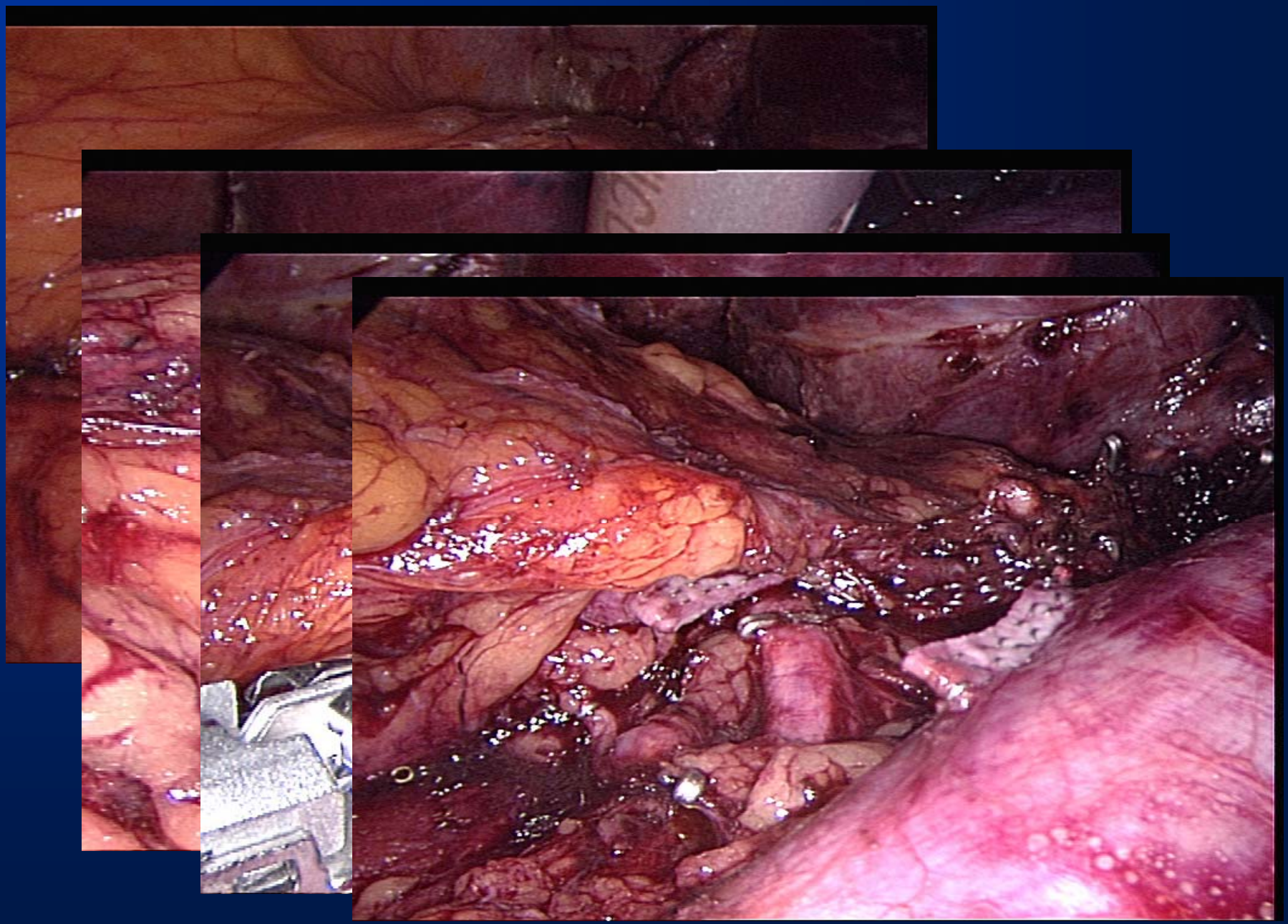


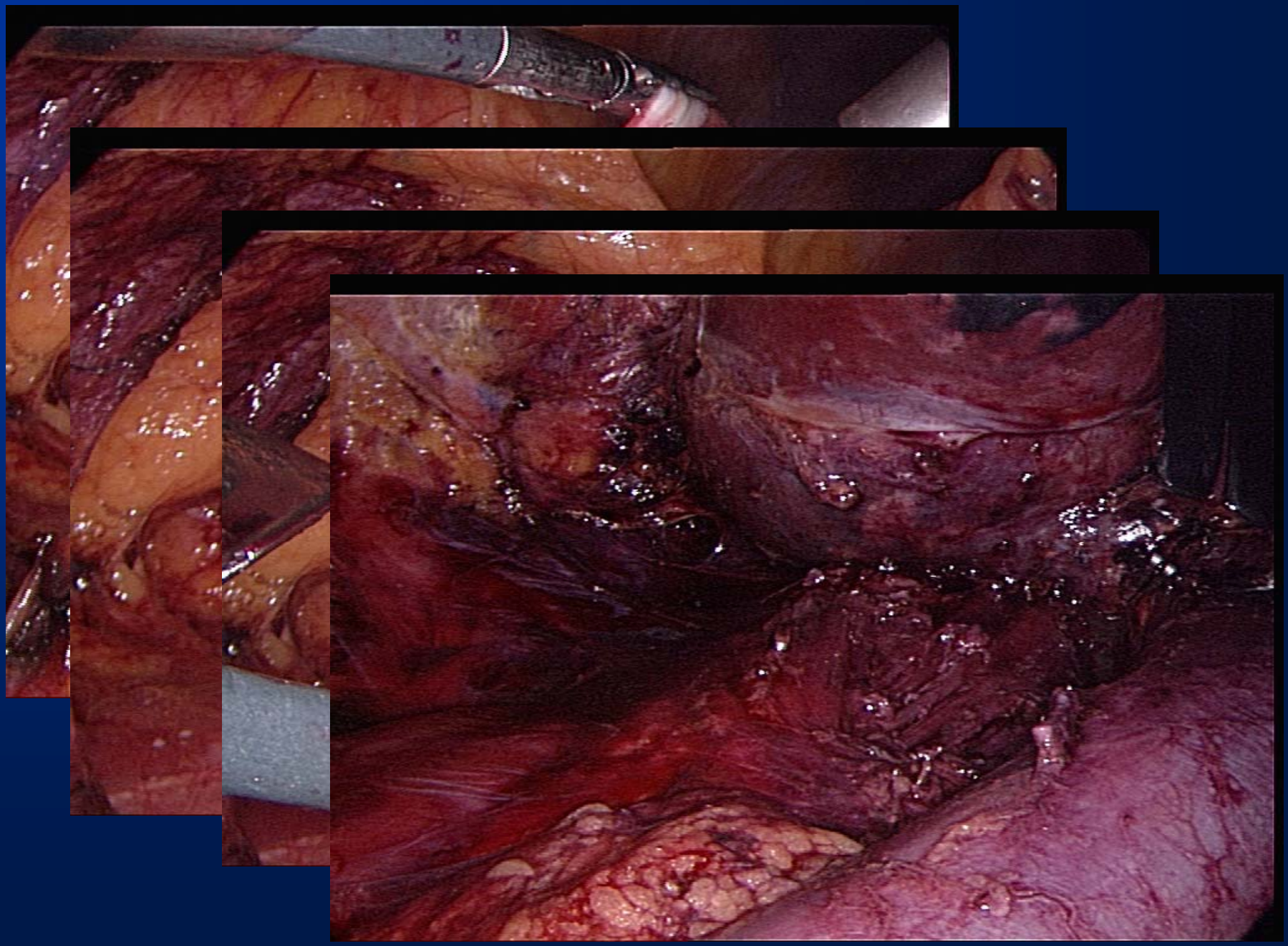




Right Side:

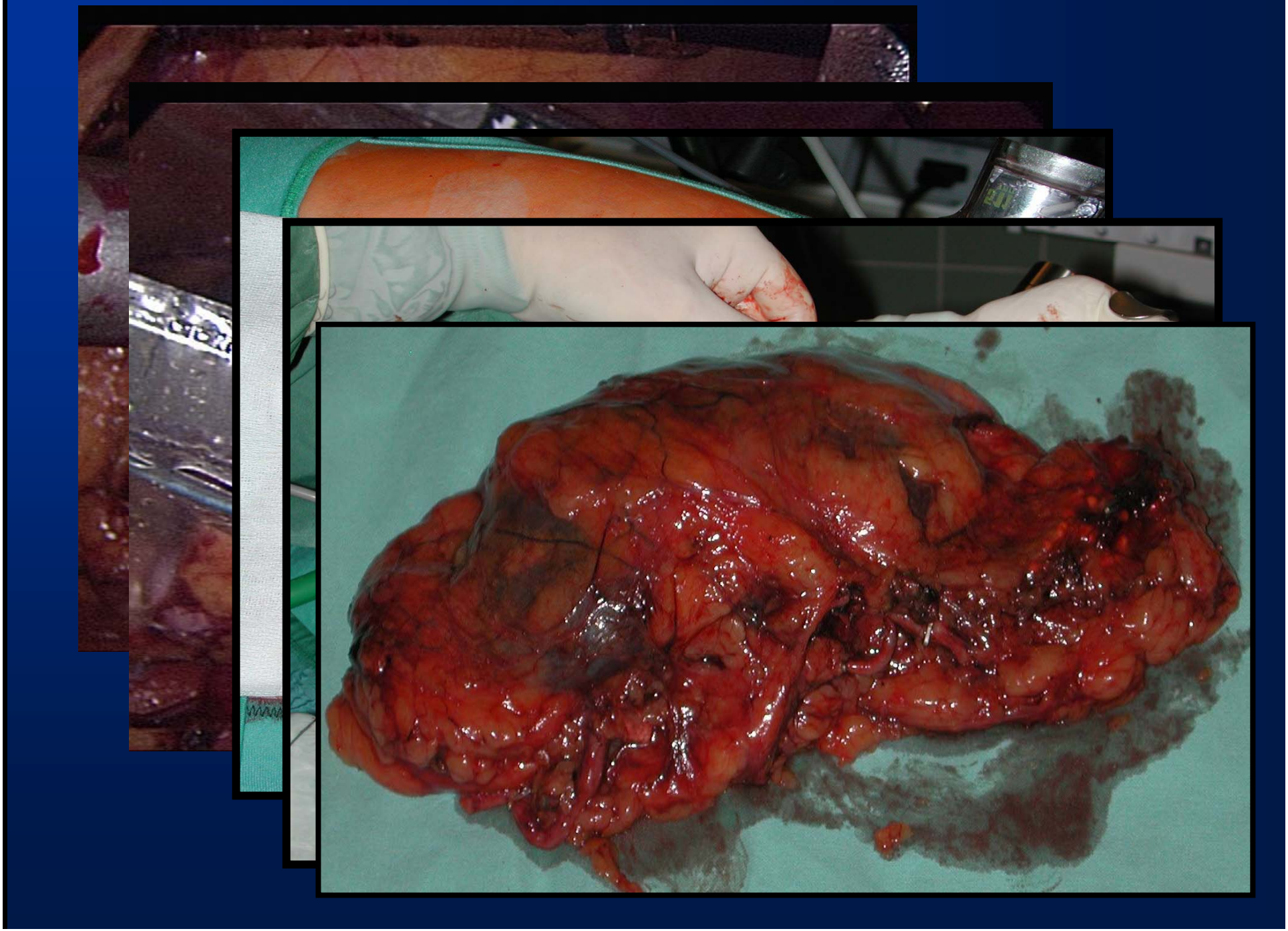






Removal of Specimen

- Intact
- Organ bag
- Muscle splitting incision



Laparoscopic Partial Nephrectomy for RCC

- ➔ Easy and fast approach
- ➔ Difficult resection

Technique

I. Without Ischemia

II. Warm Ischemia

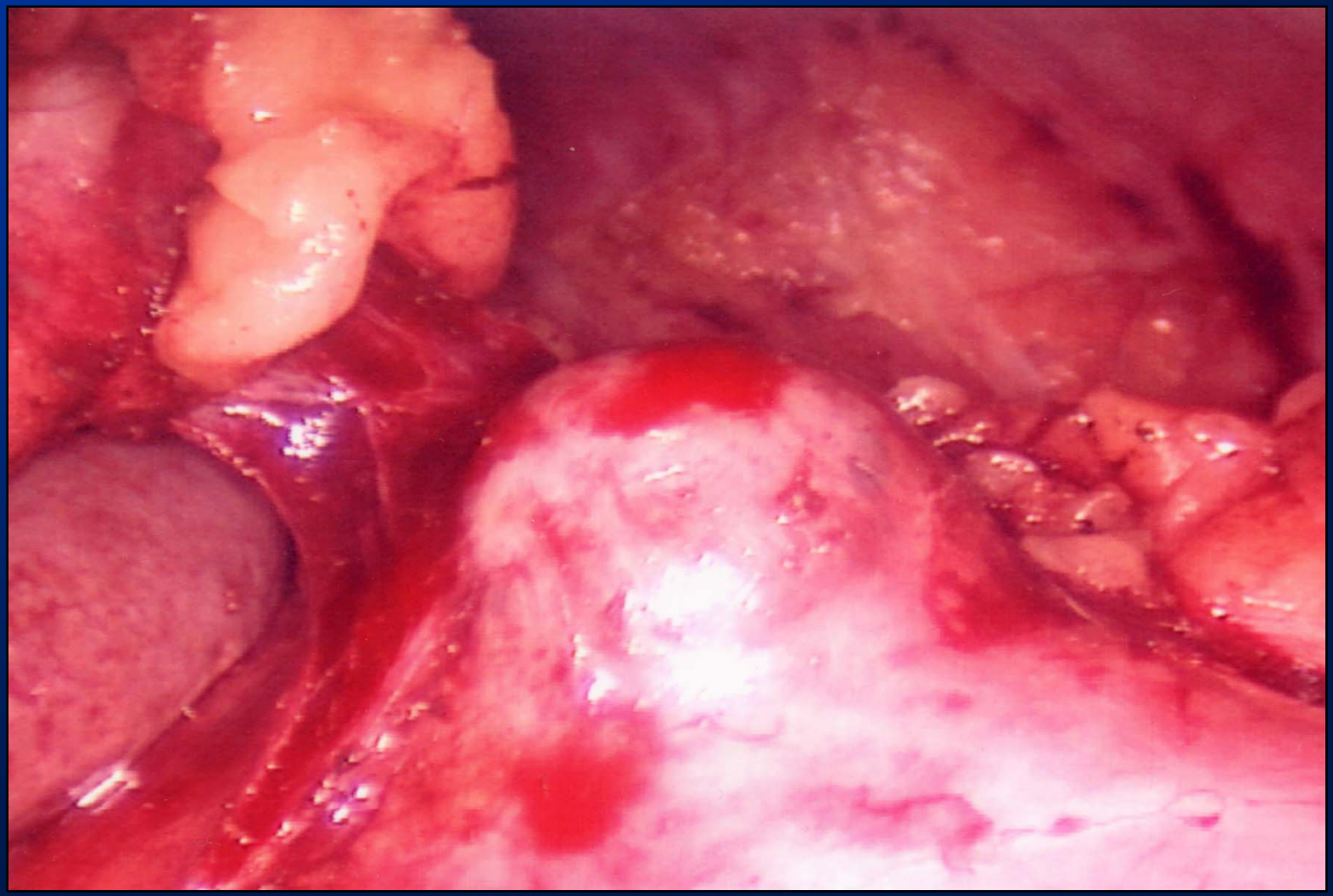
III. Cold Ischemia

Resection without Ischemia:

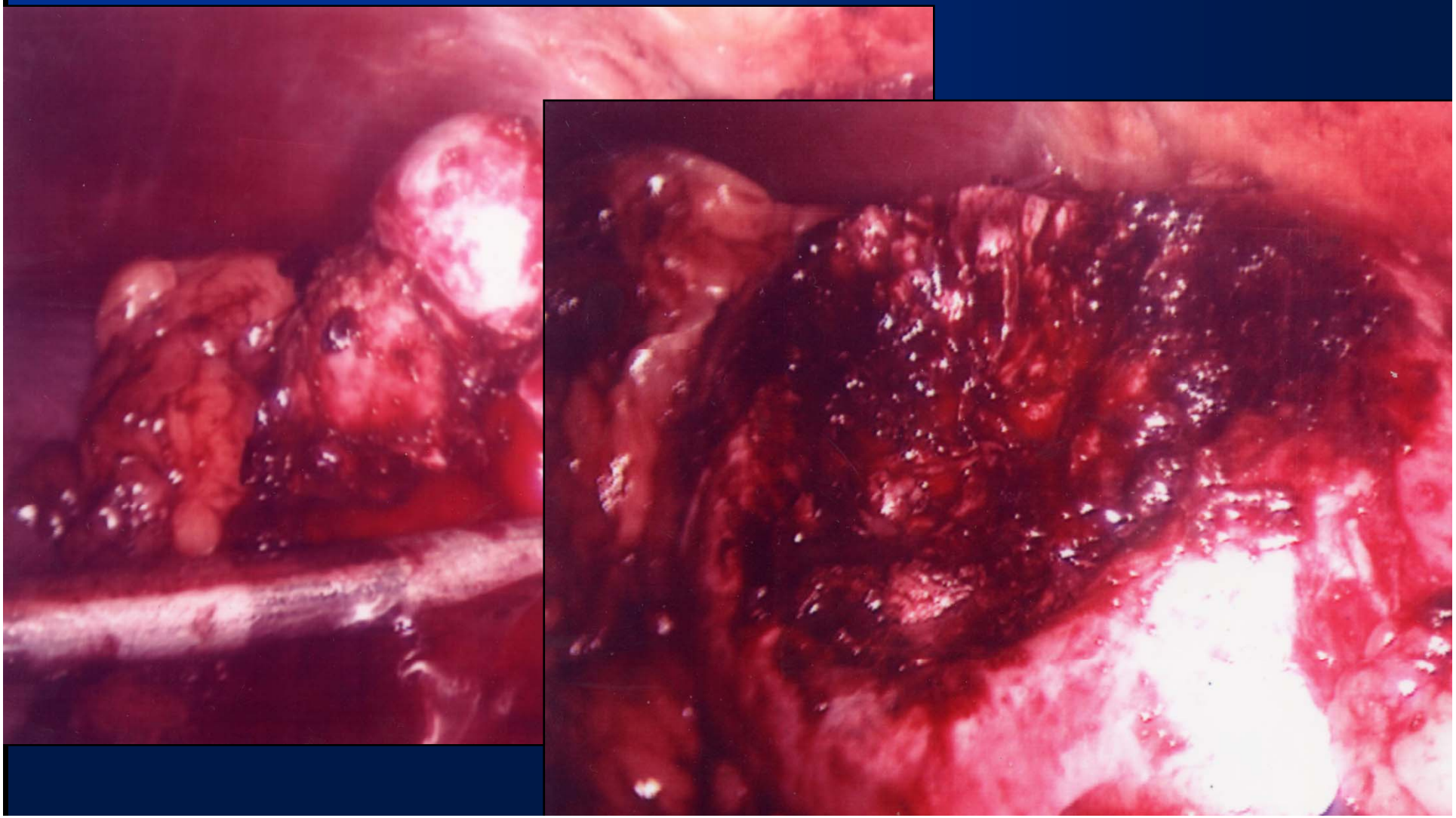
Technique

1. Renal artery and vein are not dissected
2. Step by step excision of tumor – simultaneous hemostasis
3. Hemostasis:
   - Bipolar coagulation
   - Compression surgical sponge + hemostatic material
   - Argon beam coagulator
4. Sealing of cut surface:
   - Fibrin glue

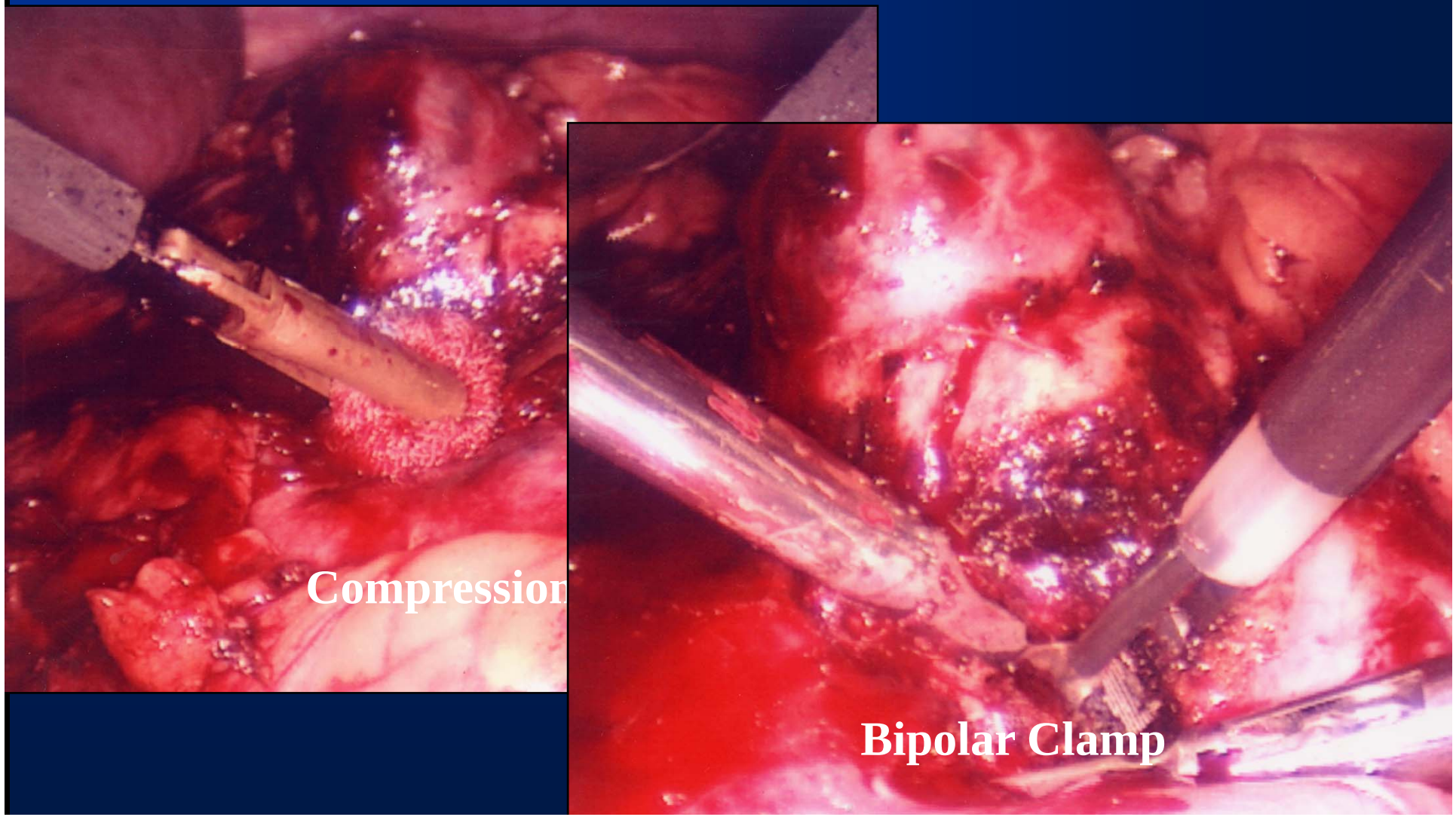
Wedge Resection



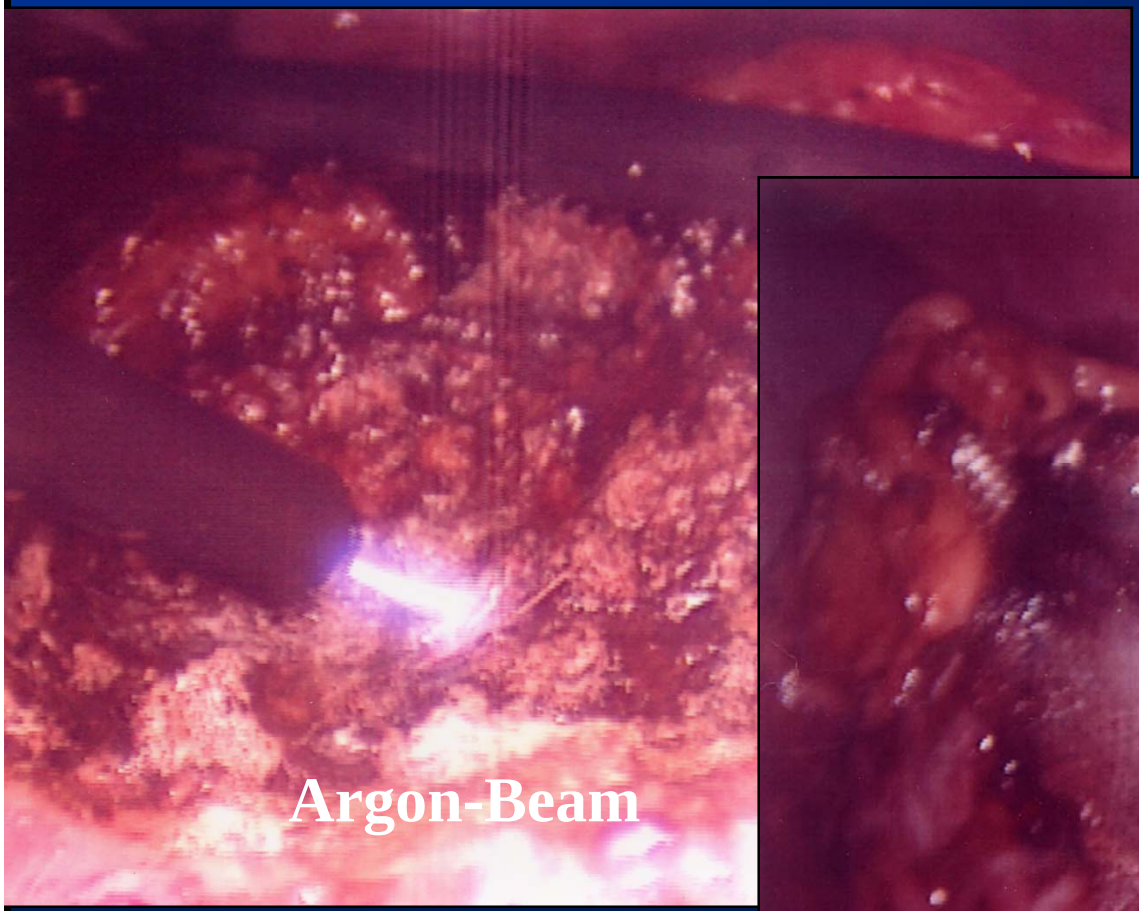
Wedge Resection

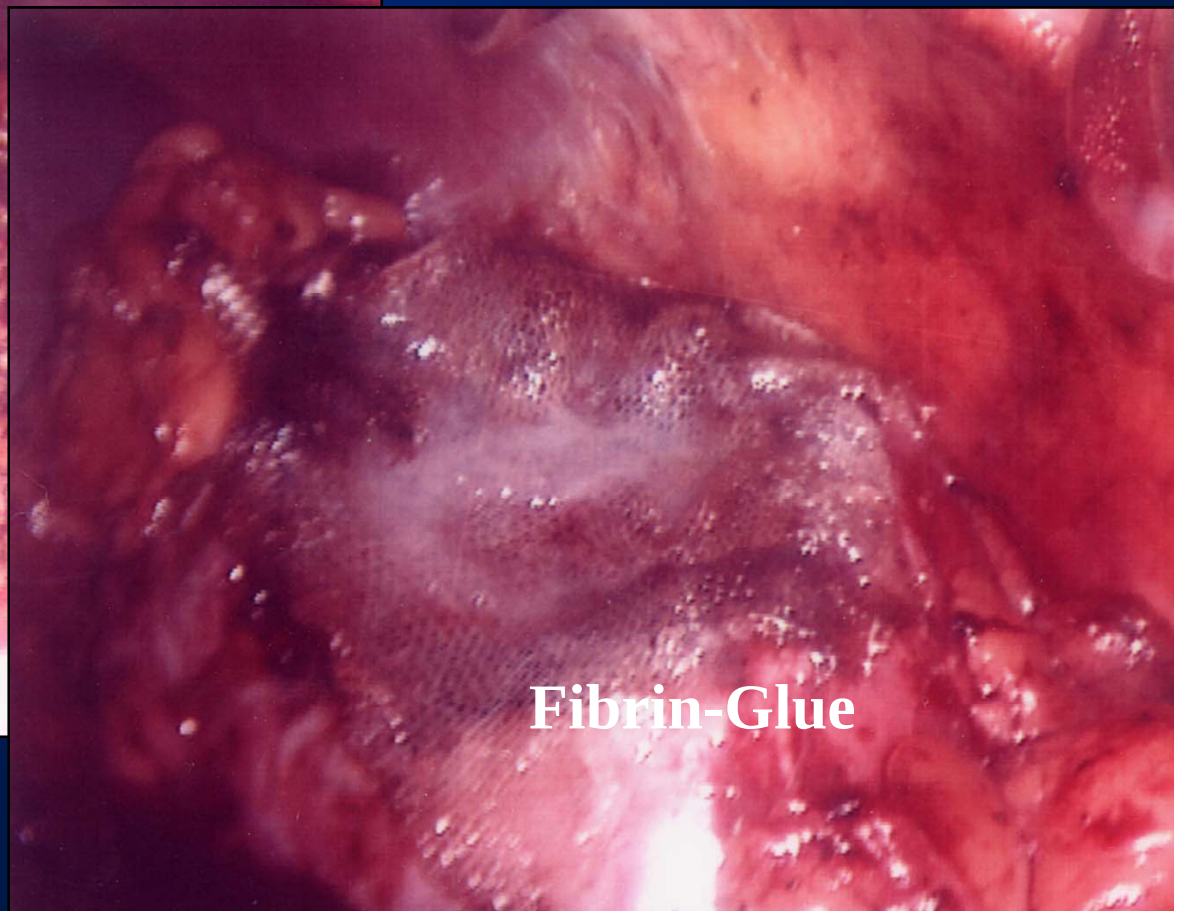


Hemostasis



Hemostasis





Laparoscopic Nephron Sparing Surgery With Ischemia

Objectives

- Bloodless Field
- Complete Tumor Excision
- Precise Reconstruction

Warm Ischemia:

Technique

1. **Dissection of renal artery and vein**

2. **Occlusion of artery and vein:**
   bulldog clamp

3. **Excision of tumor**

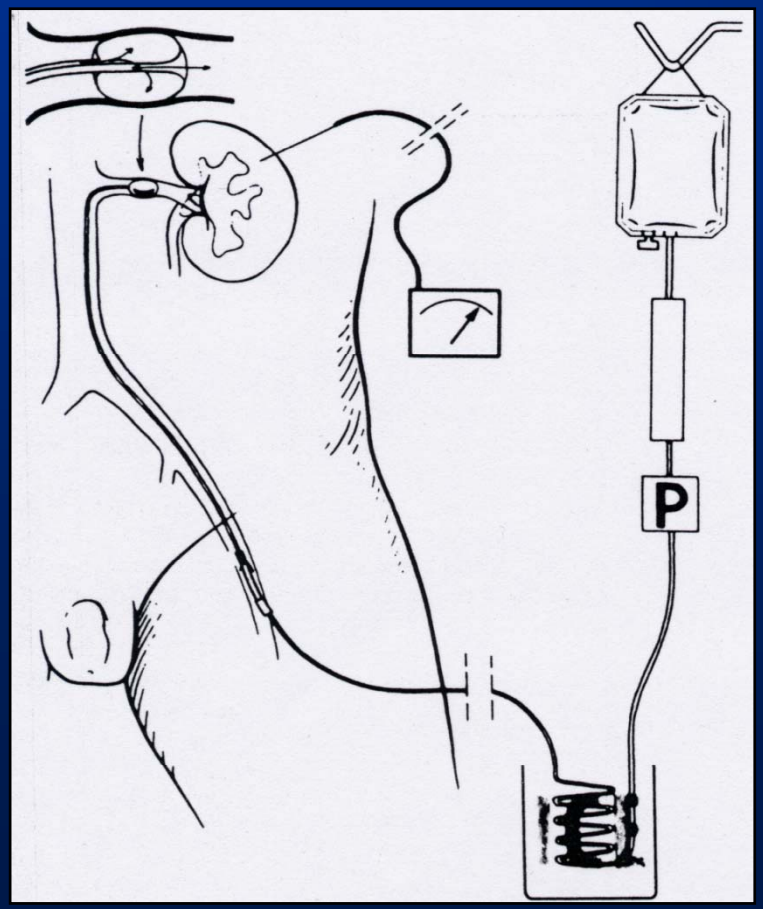
4. **Interrupted sutures through renal parenchyma:**
   Intracorporeal knotting

Problems

- Limited time
- Fear of ipsilateral kidney function deterioration

Cold Ischemia

- Cold Arterial Perfusion

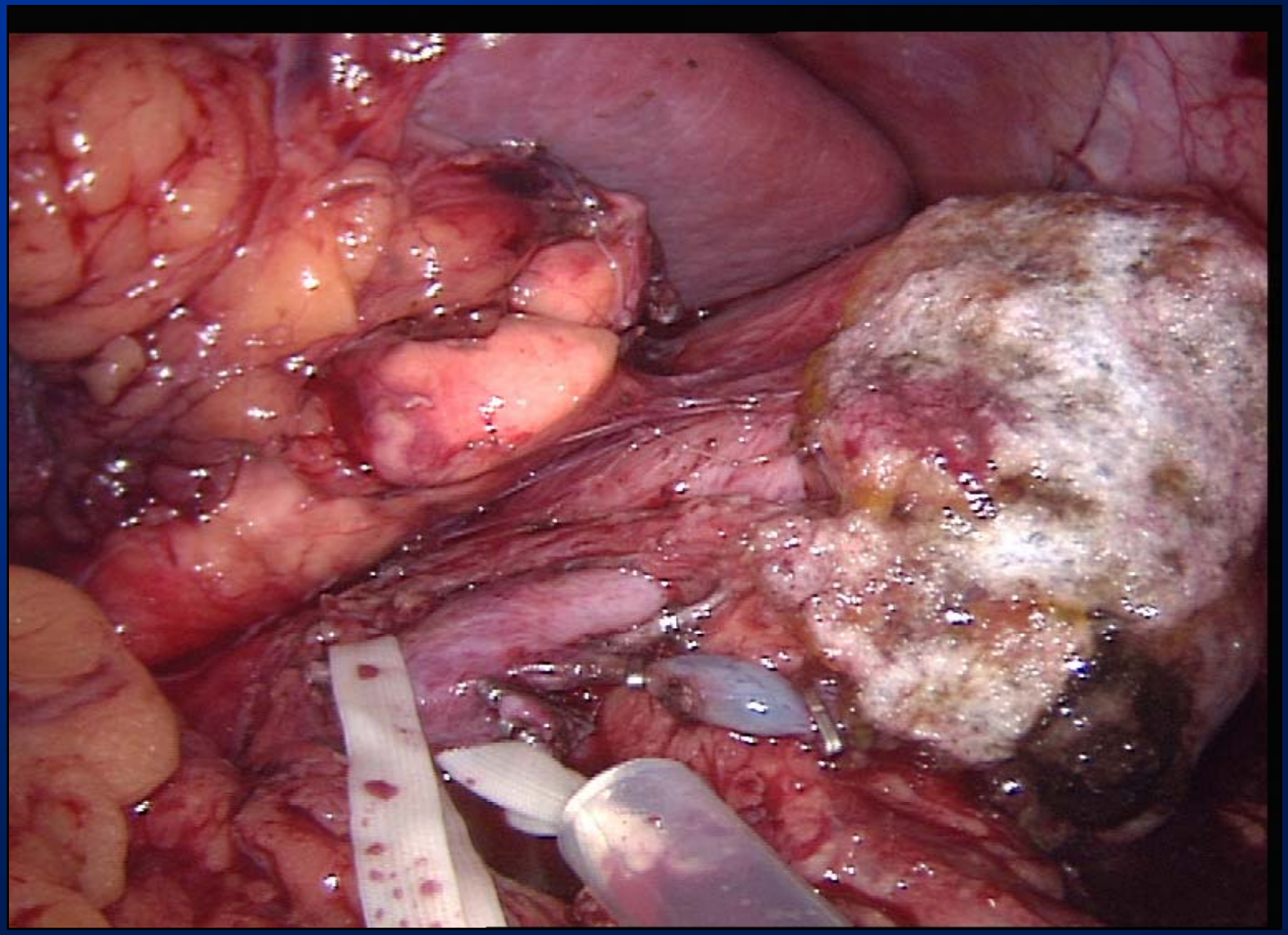


In situ Perfusion with Ringer‘s Lactate + Mannitol 27 gm./l.: Osmolality: 430 mOsm./l.

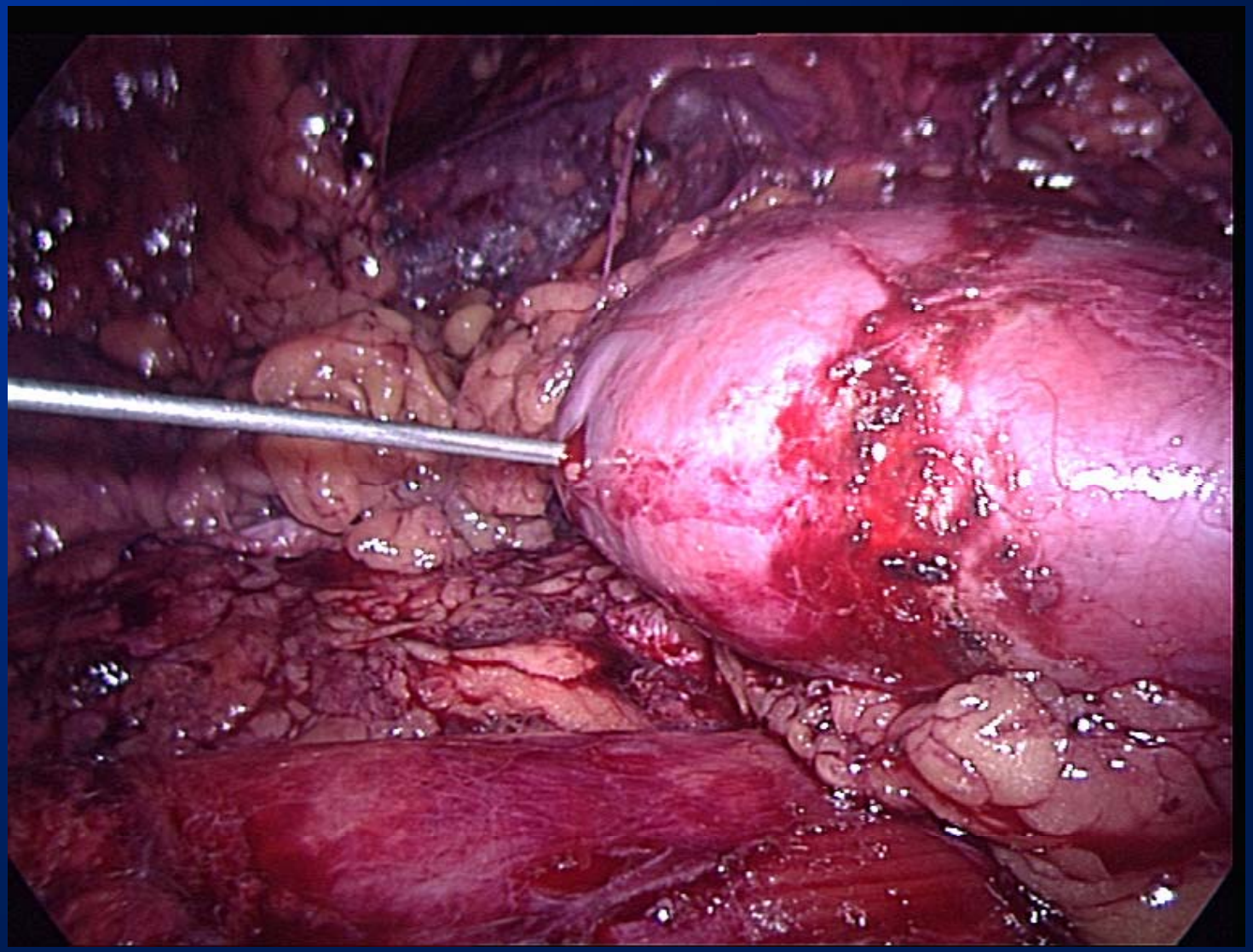
Cold Arterial Perfusion

Control of Renal Vessels

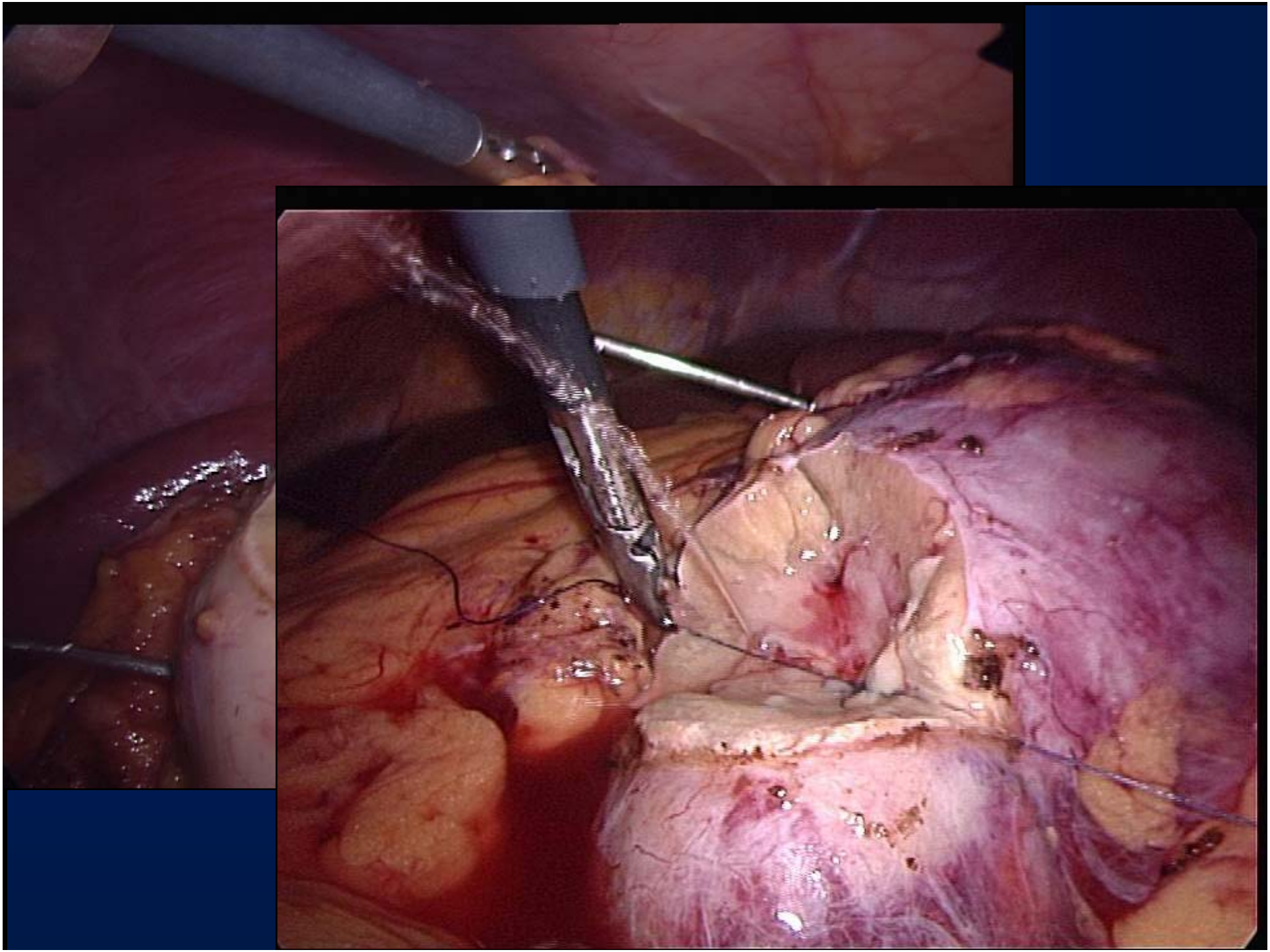
1. **Balloon:** Artery only
2. **Bulldog Clamp**
3. **Satinsky Clamp**
4. **Tourniquet:** Umbilical Tape

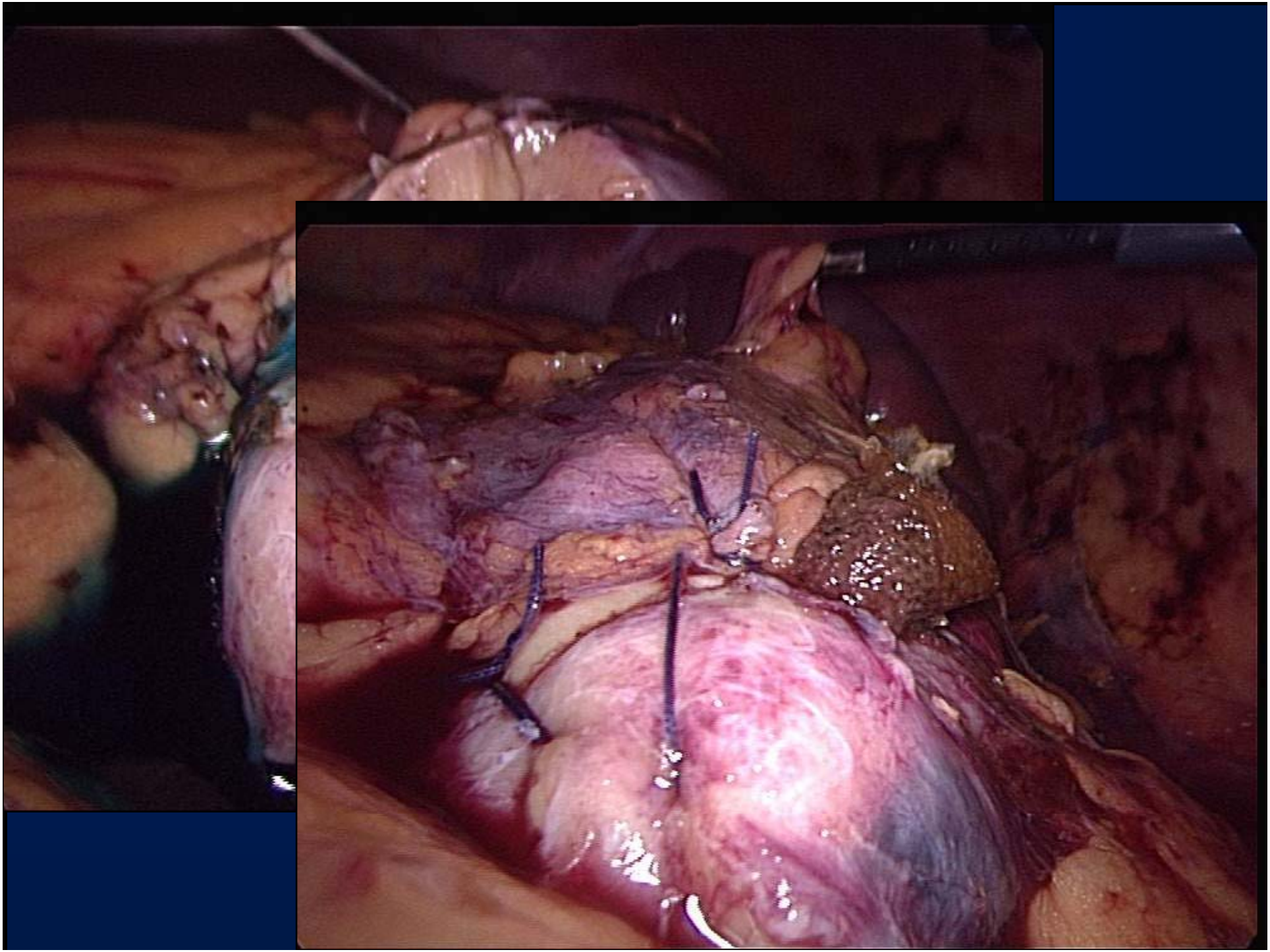


- Artery: Occlusion with Tourniquet
- Vein: secured with Umbilical Tape



- **Parenchymal Temperature: maintained at 25°C**





Urothelial Tumors Of The Kidney

- Incidence
  - 5-10 % of renal tumors
  - 5% of all urothelial tumors
  - Male : females 3:1
  - White :black 2:1
  - Age common in fifth to seventh decades

Urothelial Tumors Of The Kidney

- Risk factors
  - Occupational
  - Smoking
  - Coffee
  - Analgesic
  - Cyclophosphamide
  - Hereditary

Urothelial Tumors Of The Kidney

- Distribution
  - Bilateral in 2-5% either synchronous or asynchronous
  - 2-4% associated with bladder cancer but in occupational cancer the incidence may reach 13%

Urothelial Tumors Of The Kidney

- Pathology
  - Transitional cell cancer
  - Squamous cell cancer
  - Adenocarcinoma
  - Inverted papilloma

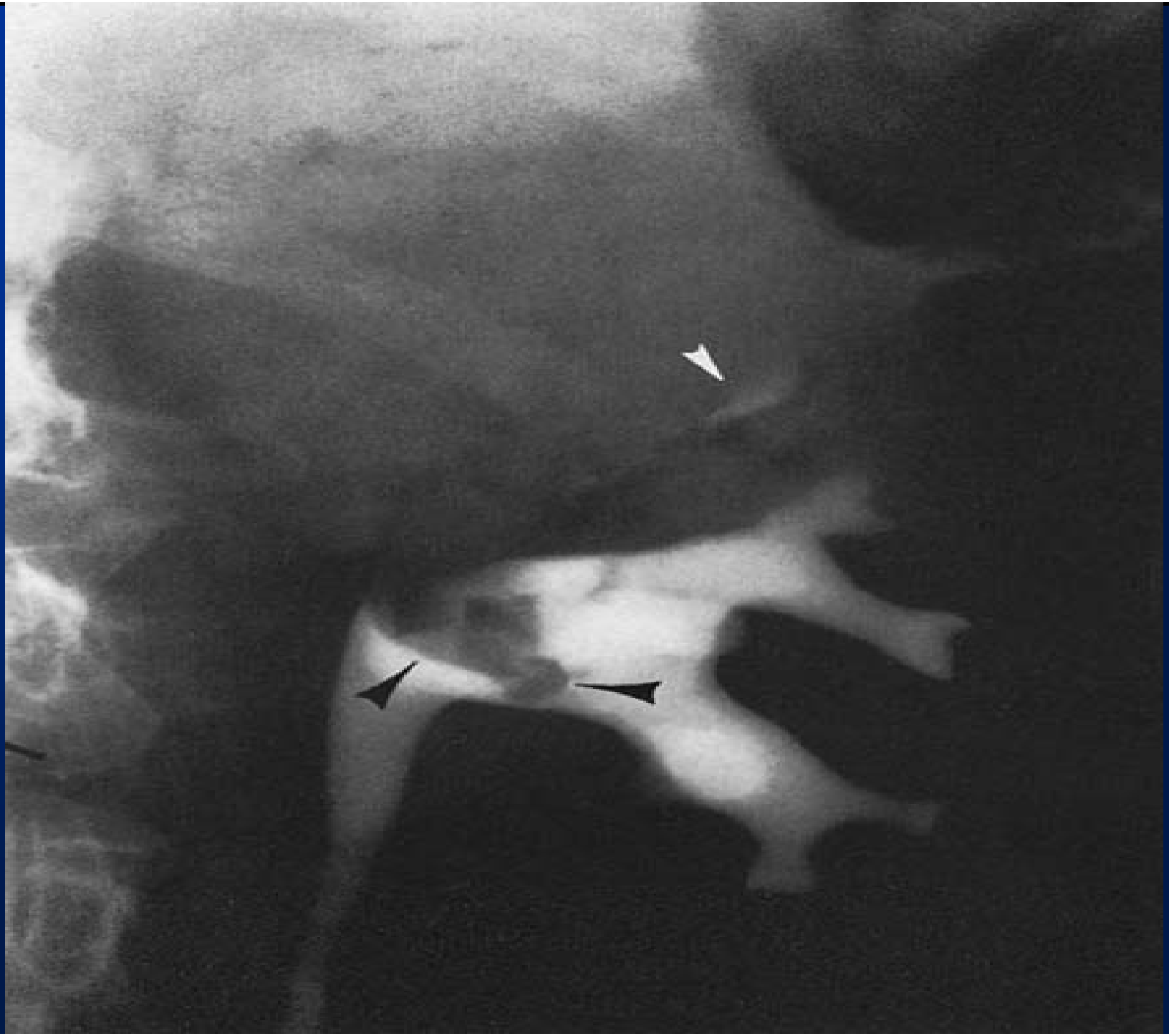
Urothelial tumors of the kidney

- Clinical picture
  - Hematuria in 75%
  - Flank pain
  - Acute flank pain due to passage of clots
  - Asymptomatic in 10-15%
  - Symptoms of advanced disease
  - Anorexia ,wt loss ,bone pain

Urothelial tumors of the kidney

- Investigation
  - Radiology
    - Excretory urography
    - Retrograde urography ,selective cytology and brush biopsy
    - C.T
    - MR
  - Flexible uretoroscopy and biopsy


B




A


B


A

Urothelial tumors of the kidney

- Staging

Grabstald Cumming system

I Confined to mucosa

II Invade lamina propria and confined to submucosa

III Tumor invade to muscles of the pelvis or renal parenchyma

VI Extended to the muscles, renal capsule or distant metastasis

TNM system

Urothelial tumors of the kidney

- **Treatment**
  - **Radical nephrouretrectomy**

Distal Ureterectomy

- An anterior cystotomy may be made and intravesical and extravesical dissection
- One centimeter of bladder mucosa is included circumferentially around the ureteral orifice.
- The defect in the bladder wall at the ureteral hiatus is closed in two layers from within the bladder using interrupted 2–0 or 3–0 absorbable suture on the muscle and 4–0 suture on the mucosa.
- The anterior cystotomy is closed carefully in two layers with running 3–0 absorbable suture.

Distal Ureterectomy

The same dissection may be performed entirely by extravesical dissection of the distal ureter and the intramural portion within the bladder wall all the way to the ureteral orifice

Distal Ureterectomy

- Complete endoscopic, transvesical, distal ureterectomy may also be performed and the dissected ureter intussuscepted into the bladder.

- This approach has obvious benefit when it is combined with laparoscopic removal of the kidney, but it is of much less value for open nephroureterectomy

Urothelial tumors of the kidney

Indication of conservative treatment

- Solitary or functioning dominant kidney
- Bilateral tumors
- Small polypoidal low grade tumor

Urothelial tumors of the kidney

- Conservative Treatment
  - Uretrorenoscope and resection or laser fulguration
  - PC resection
  - Instillation therapy
  - Radiation therapy
    - Post operative to decrease recurrence
    - For painful osseous metastasis
  - Chemotherapy
    - M-VAC


THANK YOU